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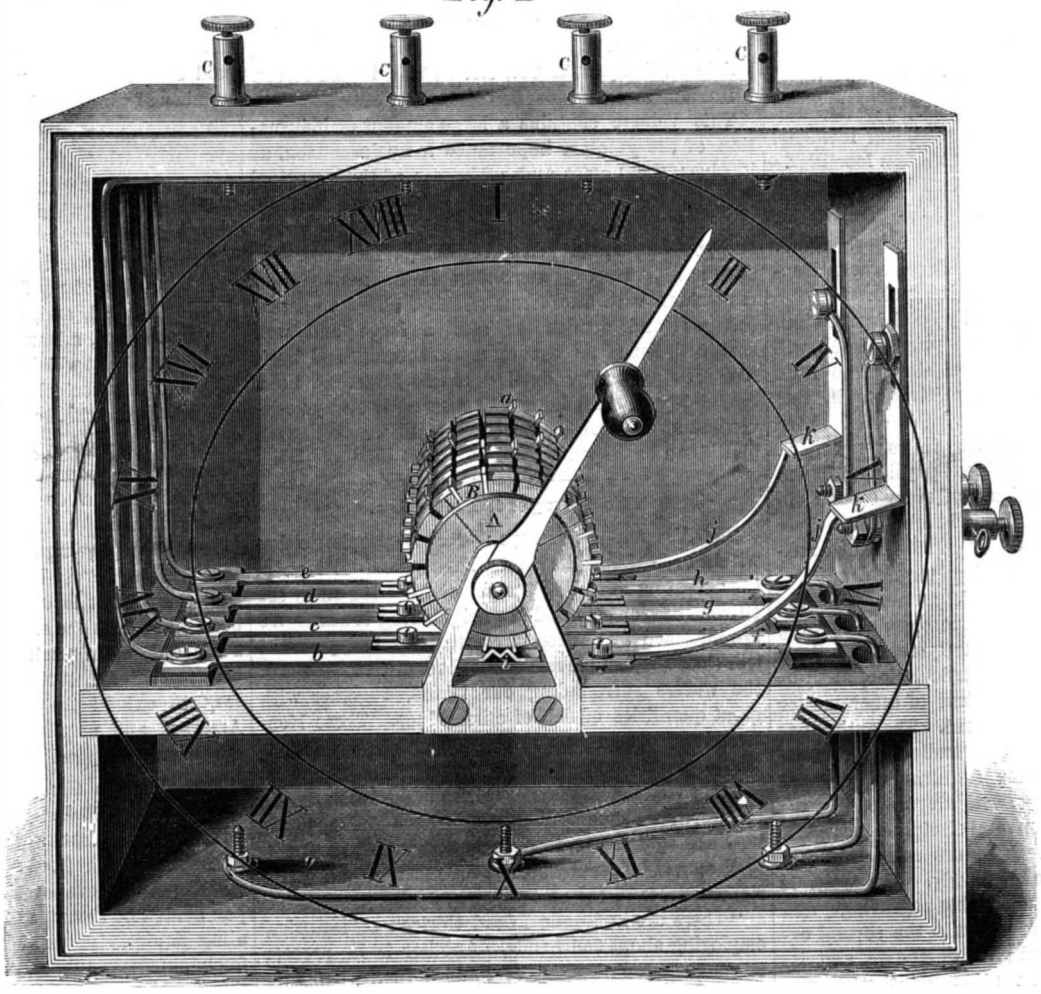
Permutating Telegraph Switch.

In central or way telegraph offices, where any considerable number of different lines or wires have their terminii, it is frequently necessary to place the various conductors in communication, so that messages may be continuously transmitted from one city to another without stoppage or re-writing at the central office. This union is generally effected by means of a "switch," which consists of a pivoted bar of metal, so made that on being properly turned it will form a conducting medium to bring a pair of wires or lines into electrical communication.

Our engravings illustrate a very ingenious improvement by which a single instrument may be made to serve the useful purposes of a large number of the ordinary switch devices. A is a small cylinder of some non-conducting material. Extending across its surface, fastened in grooves, is a series of conducting or connecting bars, B, having teeth, *a*, projecting from them, as shown in Fig. 2. The terminii of the different wires or telegraph lines are made in the form of flat springs, *b c d e f g h*, and they are arranged directly under the cylinder, A, toward which they press. In our engraving the springs at the left are attached to the wires which extend up to the screw cups, C, upon the case. The springs at the right pertain to wires that lead below to screw cups under the case, and may connect with the relay instrument, sounder, ground plate or battery.

Fig. 1



LEWIS'S PERMUTATING TELEGRAPH SWITCH.

It will now be apparent that the several springs are practically so many terminations of electrical conductors or telegraph wires, and the several bars, B, serve to form connections between said wires, for the electric fluid will pass along the bars, B, from one spring or wire to another. The bars, B, having been suitably arranged on the surface of the cylinder, may be made to make any desired connections between two or more of the springs. These connections may be established or changed by rotating the cylinder, so as to bring a new bar into contact with the springs. The cylinder is rotated by means of the pointer which traverses a dial face upon the exterior of the instrument. Each number upon this dial indicates to the operator a certain pre-arranged set or combination of connections between the springs. If, for example, the pointer is set at III. it may indicate that wires between New Haven, Philadelphia and Albany are connected; if the pointer is now moved to VI. the cylinder is also turned, and a new connecting bar, B, is brought into contact with the springs, which may connect the wires between New York, Boston, Washington and Buffalo, and so on. The number of permutations of which a small instrument like this is susceptible is very great, and its extensive utility must be obvious. These permutations may be increased by enlarging the cylinder or by employing two or more cylinders in the same instrument.

Fig. 2

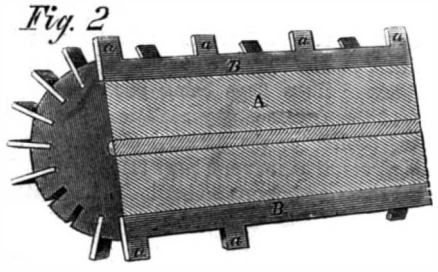
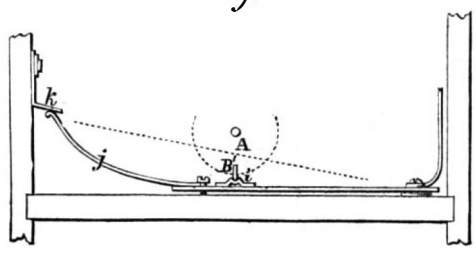


Fig. 3



The springs are provided at *i* with notches to receive the teeth of the connecting bars, as shown in Fig. 3. The notches serve to hold the cylinder in whatever position it is set by the operator; but the pressure of the springs against the teeth is not great, consequently the cylinder may be readily changed in its position, by moving the dial pointer. The friction of the inclined sides of the notches, *i*, keeps the parts always bright. The several extremities of the springs are forked, and in the fork of each there is a screw stop, which serves as a guide and also prevents the springs from rising too far; contact with the cylinder, when it is so turned that none of the springs are acted upon by the projections, *a*, is thus prevented.

The length of the springs may be increased, if desirable, by the attachment to them of curved parts, *j j*. The extremities of these curved parts press against the under side of the metallic plates, *k*; and these plates are connected to wires leading to any desired screw cup. Two examples of this mode of extending the springs are shown at the right, in the engraving. See also Fig. 3.

The patentee claims:—1. The cylinder and the connecting bars, or their equivalent devices. 2. The springs acting against the barrel. 3. The alternate arrangement of the springs. 4. The notches, with inclined edges, upon the springs. 5. The mode of limiting the upward movement of the springs. 6. The combination of the cylinder with its connecting bars, and the springs with the dial and pointer. These constitute the principal features of the invention, as illustrated in our engraving; and they appear to be very broadly covered by the patent.

This invention was patented on Oct. 20, 1863, by James Lewis, who may be addressed for further information at Mohawk, Herkimer county, N. Y.

CHEMISTS AND DRUGGISTS AND THE METRIC SYSTEM.—At a recent meeting of the Society of Arts, England, after Mr. Browne had read his paper upon the Metric System of Weights and Measures, the Chairman, Mr. Heywood, remarked that the whole of the chemists and druggists in the provinces were in favor of the metric system, and considered that its adoption would prove of incalculable benefit to them in their business.

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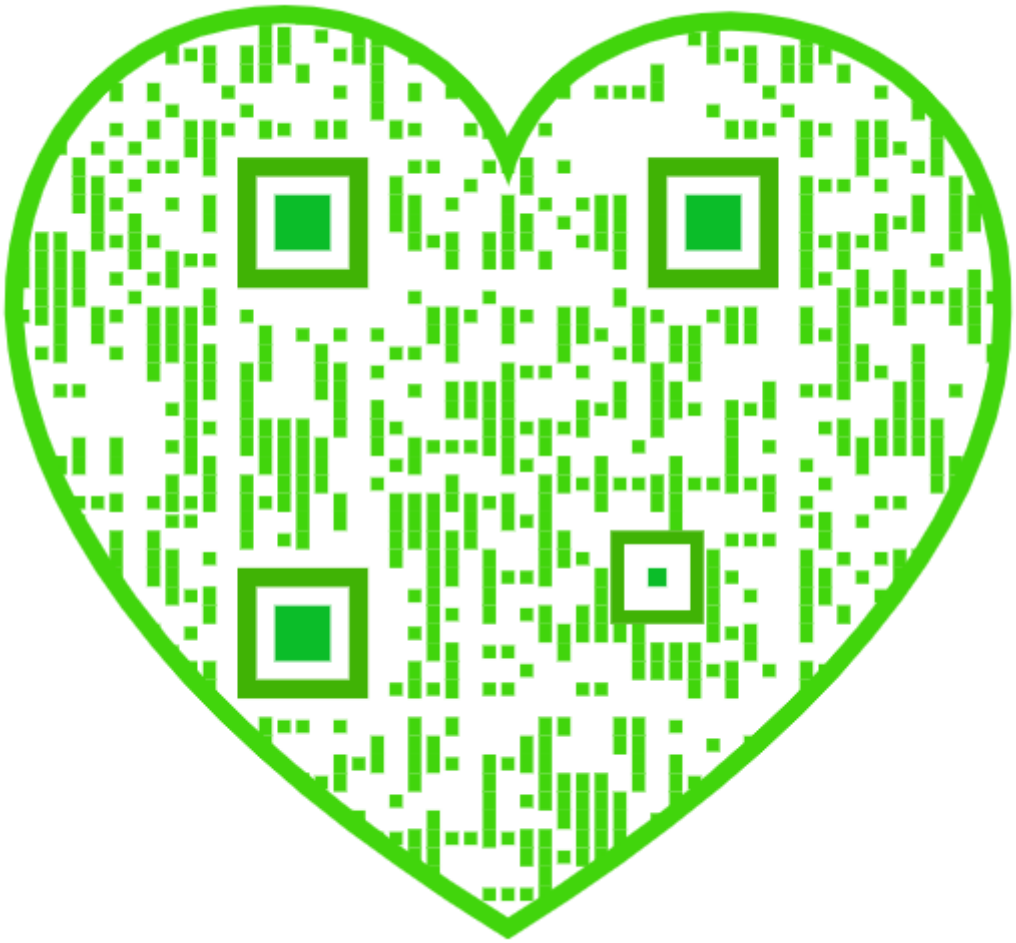

NEW BOOKS AND PUBLICATIONS.

CYCLOPEDIA OF COMMERCIAL AND BUSINESS ANECDOTES. D. Appleton & Co., 443 Broadway.

Under this somewhat incongruous title the Messrs. Appleton announce a new work, to be published by subscription. The book is a collection, original and selected, of the choicest, most striking, and *recherché* anecdotes of merchants, bankers, mercantile celebrities, millionaires, &c., and comprises interesting reminiscences and facts, with notable sayings and witticisms. It is in no sense intended as a work of biography, or collated facts, only so far as either of these are anecdotically illustrative of business character or dealing, in the various aspects of the ingenious, the mirthful, and the wonder-exciting. It is the first work of the kind which has ever appeared in this or any other country, devoted to the humorous phase of trade and traders. The anecdotes in this Cyclopedia pertain to the celebrities of traffic in all ages and nations, such as Astor, Rothschild, Girard, Baring, Lorillard, Peabody, Lawrence, Hope, Touro, &c. Every library of note in the largest cities of the country has been explored for the materials of the work, and the best private sources within the circle of men of letters have also been resorted to. It has occupied the time of the author for fifteen years. In every case, an anecdote which could not stand a fair test of authenticity, has been rejected.

The work will be illustrated with forty steel portraits of noted merchants of Europe, Asia, and America, as well as wood-cuts of amusing incidents in their lives, and views of many business localities.

The work will be published in two large volumes, octavo, over 400 pages each. Price $6.

ELOCUTION, CALISTHENICS, AND GYMNASTICS. By J. Madison Watson. Published by Schemerhorn, Bancroft & Co., New York and Philadelphia.

If people can become healthy by good instruction, then this handsomely bound and printed book will accomplish a most important mission. Too little attention is paid to physical cultivation in this country, and our people are becoming diseased, shorn of vitality, benumbed intellectually in consequence; this is strongly asserted by eminent physiologists and medical men, and the experience of every careful observer warrants the assertion. In the work here noticed the author has collected a great deal of excellent instruction upon the subject of physical cultivation, relating not merely to the improvement of the body itself, but to the organs and members composing it. Under the head of "Vocal Gymnastics" there are treatises upon respiration, articulation, analysis of English words, and a great deal of other matter relating to intellectual improvement. The author has discovered that mere climbings, standing on the head, &c., are not the only means for bringing life and health to exhausted or imperfectly developed frames; and he therefore combines mental discipline, or rather exercises the organ of speech in the same way that he does the other parts of the body. The work is profusely illustrated with admirable engravings, and the positions of the pupil or pupils in the several exercises are clearly portrayed; the dumb-bell and its uses, as also the club and rings, together with motions and positions independent of their use, are treated at length. For schools and educational institutions this work will, no doubt, become a standard one, and the individual reader will obtain a great deal of information from its pages.

ASTRONOMICAL AND METEOROLOGICAL OBSERVATIONS.

We have received from the United States Naval Observatory, Washington, under the superintendence of Capt. J. M. Gilliss, U. S. N., a very large volume, of 700 pages, filled with tables of astronomical and meteorological observations made during the year 1862. We are surprised that in so extensive a meteorological observatory no better means are had for observing the direction and force of the wind. The direction is judged by looking at the weather-vane which cannot be seen in dark nights, and the force is simply guessed at. If the vane was mounted on a light rod which extended downward into a warm room, and bore upon its lower end an index traversing a graduated circle, the direction of the wind might be known to a single degree at any hour of the day or night. And, certainly, some of the instruments for measuring the force of the wind are more to be trusted than simple guesses.

SQUADRON TACTICS UNDER STEAM. Published by D. Van Nostrand, 192 Broadway, New York.

In this useful work to navy officers, the author, Commander F. A. Parker, demonstrates—by the aid of profuse diagrams and explanatory text—a new principle for manœuvering naval vessels in action. The author contends that the winds, waves, and currents of the ocean oppose no more serious obstacles to the movements of a steam fleet than do the inequalities on the surface of the earth to the manœuvres of an army. It is in this light, therefore, that he views a vast fleet—simply as an army; the regiments, brigades, and divisions of which are represented by a certain ship or ships. The work of Sir Howard Douglas, "Naval Warfare," and the *Tactique Navale* of the French, are the only authorities on steam tactics which are worthy to be consulted; the English work is useful, but establishes no fixed system of manœuvering, while the French work is considered by officers of our service as being by far too intricate. The author says it has been his aim to combine simplicity of formation with celerity of execution; and he modestly leaves the verdict upon his labors with his readers; that it will be favorable to him we have no doubt. The volume is handsomely bound with blue and gold embossing, printed on fine paper, and profusely illustrated with 77 engravings.

THE NEW YORK STATE BUSINESS DIRECTORY FOR 1864. Adams, Sampson & Co., No. 91 Washington street, Boston, Mass.

This volume contains a large amount of information of the greatest importance to business-men, as it gives the names and addresses of the principal firms in all branches of business throughout the State of New York; also the population of the State, towns and post-offices, manufacturing companies, insurance companies, banks, steamship lines, newspapers, magazines with the terms of subscription to same, colleges and academies; also a large and well compiled list of merchants, manufacturers and business-men generally, outside of this State. A book containing all these important matters is always convenient as a work of reference, and we do not see how it can be dispensed with.

The Newport Fisheries.

The *Newport News* says:—"Few people, either within or without the State, have a correct idea of the extent and value of the fisheries carried on by the citizens of Newport and the neighboring towns. We are informed by parties interested that last year not less than 200,000 barrels of Menhaden were caught in the waters surrounding our island, together with great quantities of fish of other kinds. These Menhaden are chiefly used in the manufacture of oil, of which about three hundred thousand gallons were produced by the different factories in operation. This oil, worth in the market ninety cents a gallon, yields no little revenue to those engaged in the business, and, as will be readily seen, adds much to the material resources of the State.

"There are in Rhode Island thirteen oil factories, employing about 250 hands. Another is in process of construction near the coal mines in Portsmouth, which will cost about $40,000. It is expected that it will be ready to use during the coming season. There is, in fact, every indication that this branch of business will be greatly enlarged. Five new companies of fishermen have just been organized with about forty men and an aggregate investment of $20,000. This, of course, makes business for our boat-builders and seine manufacturers, who at present have more than they can do. An establishment in Tiverton has a contract for two thousand dollars' worth of these boats, and persons in Bristol have another for over two thousand dollars, while parties here have engagements for more than four thousand dollars. Other builders doubtless have similar contracts, though we are not able to state the amounts.

"In Portsmouth, Capt. Benjamin Tallman, the oldest and most successful seine fisherman in Rhode Island, is adding about six thousand dollars to his already large establishment, and is otherwise preparing for a vigorous campaign. He employs about forty men, and is honored as the inventor of what is known as trap-fishing. In the estimation of those who know him he is the real live *king fisher* of the island, like Saul of ancient time, standing head and shoulders above his brethren.

"In addition to the income from the oil extracted from these fish, the guano manufactured from the refuse brings in quite a little sum. One hundred barrels of Menhaden produce two and a half tuns of this article, which is a great fertilizer, and sells readily in bulk at $15 a tun. From the income thus secured those engaged in the Rhode Island fisheries seem to be doing a most profitable business, and it is said that some of the gangs cleared last year over one hundred dollars a month. Of course, the profits of the capitalists were large, as is evident from the prospective increase of the capital and labor devoted to the work."

MISCELLANEOUS SUMMARY.

HOW TO MEASURE COAL.—Coal put into bins and leveled can be measured, from one to a thousand tuns, with as much accuracy as it can be weighed on scales. For instance, Lehigh white-ash coal per tun of 2,000 pounds, of the egg or stove size, will uniformly measure 34½ feet cubical, white-ash Schuylkill coal will measure 35, and the pink gray and red-ash will reach 36 cubical feet per tun of 2,000 lbs. or 40 feet for 2,240 pounds, the difference of cubical contents between the net and gross tun being exactly 4 feet. If the length, breadth and height of the bin be multiplied together, and the product divided by the aforesaid contents of a tun, the quotient must show the number of tuns therein.—*Troy (N. Y.) Advertiser.*

ELEVATION OF THE WORKING CLASSES.—"I have no sympathy whatever with those who would grudge our workmen and our common people, the very highest acquisition which their taste, or their time, or their inclinations, would lead them to realize; for, next to the salvation of their souls, I certainly say that the object of my fondest aspirations is the moral and intellectual, and, as a sure consequence of this the economical, advancement of the working classes—the one object which, of all others in the wide range of political speculation, is the one which should be the dearest to the heart of every philanthropist and every true patriot."—*Chalmers.*

RAT-SKIN GLOVES.—An exchange says:—"It is rumored that a company of Frenchmen has been formed in Chicago, for the purpose of catching all the rats possible, curing their skins and exporting them to Paris, to be used in the manufacture of gloves. For years what is called 'French kid' gloves have been made from the skins of these animals, caught in Paris and other parts of Europe; but the demand being greater than the supply, it has become necessary to extend the rat-catching arrangements to America, and no finer field than Chicago for such operations can possibly present itself."

THE London *Grocer* says:—"The proprietor of the Hull Sugar Refinery commenced working Miller's patent process last week. This is the first attempt to manufacture refined sugar under this patent. Its principle is the evaporation of solutien of sugar in a pan heated by steam, at 212° Fahr.; but the evaporating liquid is kept much below this temperature by freely exposing a large surface of it to the air, and this is accomplished by having a revolving cylinder partly in the air kept in constant motion, so that fresh portions of the liquid are continually carried through the air upon the surface of the cylinder."

METALLIC FLAGS FOR SOLDIERS' GRAVES, BATTLE-FIELDS, &C.—A patriotic correspondent suggests that a beautiful tin, copper, steel or iron flag, of suitable size, ought to be placed upon each of the headstones or monuments of all officers and privates who have been killed, or who have died in the service during the rebellion; these flags being purchased by the friends of the deceased, by societies, cities, towns, counties, States, or the national Government. He also suggests that a very large iron flag should be upreared on every important battle-field or national cemetery.

TREATMENT OF HICKUP.—This may often be removed by holding the breath, by swallowing a piece of bread, by sudden fright, or by a draught of weak liquid. When it arises from heat and acidity in the stomachs of children, a little rhubarb and chalk will remove it. Should it proceed from irritability of the nerves, take a few drops of sal volatile, with a teaspoonful of paregoric elixir. If it still continue, rub on soap liniment, mixed with tincture of opium, or a

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plaster may be put on the pit of the stomach, or sipping a glass of cold water with a little carbonate of soda dissolved in it.

TAXATION.—During the last session of Congress, a manufacturer went to Washington to get the three-per-cent tax removed from the article he produced, and the following conversation is said to have occurred between him and a member of Congress:—

Manuf.: "I came on, sir, to get relief from an oppressive burden on my branch of business. There are particular reasons why the article I make should be exempted from the three-per-cent tax."

M. C.: "What amount do you manufacture annually?"

Manuf.: "One hundred thousand dollar's worth, on which I pay $3,000."

M. C.: "And you reckon the tax you pay as a part of the cost of your article, and add it to the price, do you not?"

Manuf.: "Why—yes, sir."

M. C.: "What average profit do you calculate to make on your goods?"

Manuf.: "Fifteen per cent."

M. C.: "Then you make fifteen per cent on the amount you pay in taxes, which, if it be $3,000, will give you $450 more profit than you would get if you paid no taxes. Is it not so?"

The gentleman had no answer prepared to this question, and the conversation ceased.

OUR MACHINERY.—What a contrast does the work of the machinists of the present day present to those of a hundred years ago! At one time, as Mr. Smiles observes, an engine of any size, when once erected, required the constant attention of the engineer, who almost lived beside it in order to keep it in working order, such was the friction of its parts and the clumsiness of its construction. At the present time, however, almost absolute perfection of working is obtained. When the 5,000 different pieces of the marine engines designed for the *Warrior* were brought together from the different shops of the Messrs. Penn, although the workmen who built them up had never seen them before, yet such was the mathematical accuracy of their fit that, immediately steam was got up, they began working with the utmost smoothness. As a new-born child, as soon as it enters the world and expand its lungs, begins to stretch its limbs, so this gigantic engine, immediately steam began to expand in its cylinder, at once exerted its huge members with the smoothness and ease of a thing of life. —*Once a Week.*

CONSCIENTIOUS TRADESMEN.—Messrs. E. and J. J. Neave, of Leiston, England, have issued the following circular to their customers:—"E. and J. J. Neave, grocers, &c., Leiston (Suffolk), respectfully inform their friends and the public generally that they have long seen the injury that the use of tobacco is inflicting on their fellow-men, and the many evils that directly and indirectly arise from it; and feeling that they cannot continue the sale of it with clear consciences, give notice that, on and after——, they will cease to sell tobacco, snuff, and cigars."

AT the Government tailoring establishment at Millbank, England, where the army clothing is made, and about 60 sewing machines driven by steam are in operation, the material is cut out by machinery. A sharp thin endless ribbon of steel revolves like a band saw over pulleys driven by steam, and the cloth 6 to 8 inches thick, with the pattern chalked on the upper layer, is applied to the revolving knife, which rapidly and smoothly cuts it to the required shape; the hand of the workman being simply employed to guide the cloth so that the knife follows the chalked pattern.

TO DISTINGUISH ARTIFICIALLY-COLORED WINES.—M. Blume gives the following simple test:—"Saturate a piece of bread crumb with the wine to be tested, and place it in a plate full of water. If the wine is artificially colored, the water very soon becomes colored reddish violet; but if the coloring matter is natural, the water, after a quarter or half an hour, is but very little colored, and a slight opalescence only is perceptible. The test depends upon the difficult solubility of the real coloring matters of wine in water free from tartaric acid."

SORE EYES.—A little alum boiled in a teacupful of milk, and the curd used as a poultice, is excellent for inflammation of the eyes.

THE LEGS OF INSECTS.—M. Delisle once observed a fly, only as large as a grain of sand, which ran three inches in half a second, and in that space made the enormous number of *five hundred and forty steps.* If a man were to be able to run as fast in proportion to his size, supposing his step to measure two feet, he would in the course of a minute, have run upwards of *twenty miles*, a task far surpassing our express railroad engines, or the famous "Seven League Boots" recorded in the nursery fable. In leaping, also, insects far excel man, or any other animal whatever. The flea can leap two hundred times its own length; so also can the locust. Some spiders can leap a couple of feet upon their prey.

ENGLISH AND FRENCH IRON-CLADS.—The London *Engineer* says:—A comparative statement of the armor-plated ships in England and in France shows that we have ten iron frigates afloat, six nearly ready, and five in various stages of construction, against the French six, two, and six respectively. The *Times* pronounces strongly against the system of plating wooden-built ships. In two vessels now building—the *Lord Warden* and the *Lord Clyde*—we shall save £10,000 by having a wooden frame, and lose £200,000 by the speedy decay of the wood as compared with iron.

NEW YORK MARKETS.

[WEEK ENDING MARCH 9, 1864.]

Ashes—Pot, pearl, $8 75 to $10 per 100 lb.

Beeswax—55c. per lb.

Bread—Pilot, navy, 2nd crackers 4¼c. to 8c. per lb.

Candles—Adamantine, stearine and sperm, 21c. to 45c. per lb.

Cement—Rosendale, $1 75 per barrel.

Coffee—Java, 42c. per lb.; Rio, 37c.; St. Domingo, 33½c.

Copper—American ingot, 39c. per lb.; bolts, 46c.; Sheathing, 46c.

Cordage—Manilla, 20c. per lb.; Russia—tarred, 21½c.; American 16¼c.

Cotton.—Ordinary, 68c. per lb.; Middling, 77c.; Fair, 82c.

Domestic Goods.—Sheetings, brown standard, 42½c. per yard; Sheetings, brown, seconds, 40½c. to 41½c.; Shirtings, brown, 7-8, standard, 36c; Sheetings and Shirtings, bleached—Wamsutta and New York Mills 42c. to 42½c.; Lonsdale, White Rock, &c., 36c. to 37c.; other makers 19c. to 35c.; Drills, brown, Amoskeag, 42c. to 42½c.; Drills, other, 32c. to 38c.; Ticks, York 60c. to 65c.; Ticks, Amoskeag 42½c. to 63c.; Ticks, other 23½c. to 47½c.; Prints, Merrimack 23c.; Prints, Sprague's 21c. to 22c.; Prints, Dunnell's 20c. to 21c.; Prints, other 15c. to 21c.; Ginghams, Clinton 28c.; Ginghams, other 21c. to 27c.; Cottonades, York 40c. to 60c.; Cottonades, York Mills 45c. to 70c.; Cottonades, other 55c. to 70c.; Cotton Jeans, Laconia, &c., brown and bleached 38c.; Cotton Jeans, other 23½c. to 25c.; Cotton checks, 18½c. to 32½c.; Cambrics, 21c. to 26c.; Cotton Flannels, brown and bleached 31c. to 40c.; Cloth, all wool $1 85 to $4; Cassimeres, $1 50 to $3 50; Satinets, 80c. to $1; Flannels, 47½c. to 70c.; Broad Cloth, $4 to $8.

Dyewoods, Duty Free.—Fustic, $36 per tun; Logwood, $23 50 to $35; Lima Wood, $95 to $100; Sapan, $90.

Feathers—63c. per lb.

Furs.—Otter, $6 to $7 skins; Fox, grey silver, $6 to $10; Bear, $15 to $20; Lynx, $3 to $3 50; Marten, $3 to $20; Muskrat, 20c. to 25c.;

Flax—19c. to 24c. per lb.

Flour and Meal—$6 45 to $10 50 per barrel; Rye Meal, $5 50 to $6 40.; Corn Meal, $6 15.

Grain.—Wheat, $1 61 to $2 per bushel; Rye, $1 30; Barley, $1 35 to $1 50; Oats, 86c. to 91c.; Corn, $1 29 to $1 36; Peas, $1 18; Beans, $2 65 to $3.

Hay—$1 35 to $1 40 per 100 lbs.

Hemp.—American (dressed), $275 to $300 per tun; Russian, $425; Jute, $275 to $280.

Hides.—City Slaughter, 12c. to 12¾c.; other varieties range from 11c. to 34c.

Honey.—99c. to $1. per gallon.

Hops.—27c. to 35c. per lb.

India Rubber.—40c. to 85c. per lb.

Indigo.—Bengal, $1 60 to $2 50 per lb.; others, 90c. to $2.

Iron.—Scotch pig, $49 to $51 per tun; American, $46 to $48; Bar—Swedes (in gold), $90; English, $125; Sheet—Russia, 21c.; English, 7c. to 8½c.

Lead.—American, $10 75 per 100 lbs.; English, $11 75; Pipe, 14½c.

Leather.—Oak-tanned, 44c. to 53c. per lb.; Hemlock, 23c. to 41c.

Lime.—$1 35 to $1 60 per barrel.

Lumber.—Spruce, $18 to $20 per 1,000 feet; White Oak, $35 to $40; White Oak Staves, $40 to $180; Mahogany crotches, $1 45 to $1 50 per foot; Rosewood, 4c. to 15c. per lb.

Molasses.—55c. to 78c. per gallon.

Nails.—Cut, $6 25 per 100 lbs.; Wrought, 31c. to 36c. per lb.

Oils.—Linseed, $1 58 to $1 60 per gallon; Sperm, $1 62 to $1 85; Petroleum, 49c. to 62c.

Provisions.—Beef, $5 to $30 per barrel; Pork, $14 to $23; Butter, 27c. to 33c. per lb.; Cheese, 13c. to 16c.

Rice.—$6 75 to $8 75 per 100 lbs.

Salt.—Turk's Island, 48c. per bushel; Liverpool fine, $2 50 per sack.

Saltpeter.—17c. to 21c. per lb.

Spelter.—11½c. to 11¾c. per lb.

Steel.—English, 20c. to 28c. per lb.; German, 10c. to 17c.; American blister, 12c. to 18c.; American spring, 11c. to 14c.

Sugar.—Brown, 14¼c. to 15¼c. per lb.; White, 15c¾. to 16½c.

Tea.—38c. to $1 55 per lb.

Tallow.—American, 12½c. to 12¾c. per lb.

Tin.—Banca, 51c. to 55c. per lb.; English, 48c.; plates, $13 50 to $16 per box.

Tobacco.—Lugs, 14c. to 30c. per lb.; Cuba fillers, 58c. to 95c.; United States wrappers, 15c. to 45c.; Manufactured, 55c. to $1 25.

Wool.—American Saxony fleece, 75c. to 85c. per lb.; Merino, 75c. to 80c.; California, 25c. to 55c.; Foreign, 16c. to 60c.

Zinc.—14¼c. to 15c. per lb.

Lead as a Poison.

The large number of persons who die annually from the poisonous effects of lead should put people more on their guard, as this metal is used in a great variety of forms for the convenience of man, on account of its cheapness, and the many desirable qualities it possesses over other metals. This metal is a slow but powerful poison in all its forms when taken internally, and often its effects are not manifest until too late. Every family, therefore, should avoid using vessels lined with lead for cooking or keeping provisions in, also the use of this metal for the conveyance of water, as pure water will dissolve the inside of the pipe without the presence of some protecting salt, which forms an insoluble coating and prevents further action; even then there is danger. If you already have lead pipe, the simplest precaution is always to draw off the water contained in it before saving any for use. There is also too much imprudence among the working class with regard to this poison; the painters in their use of white lead and litharge, plumbers eating with hands soiled by particles of this metal, also in the manufacture of glazed cards, glazed earthenware, &c. Many examples of the destructive effects might be cited, but it is unnecessary, as hardly a week passes but we hear of sickness or death from the effects of the substance in question; sometimes caused by ignorance of its nature, oftener by carelessness. Our people drink their poisoned coffee at the breakfast table, poisoned wine at dinner, and poisoned tea at supper; daily mingling, little by little, this unseen destroyer with their food. More caution should be manifested by all, and especially by those engaged in the manufacture of the compounds of lead, and the application of them to the arts.

Crash of a Wind-wagon.

Several of the French papers publish the following account:—

"Recently a curious spectacle collected four or five hundred persons on the Place d'Ault, Department of the Somme. This was the trial of a mechanical carriage, invented by the man who carries the mail between Woincourt and Ault. The carriage was arranged to be propelled by a screw driven by the wind. The departure was effected with a little difficulty in consequence of the hill which it is necessary to mount in order to reach the route from Saint-Valery to Eu. Arrived there, however, the evolutions succeeded to a marvel, amid the applause of the curious, who had followed the vehicle. But it was not the same in returning to Ault. The descent drew the carriage and its conductor with a speed equal to that of an express train, and this speed, which increased every moment, would infallibly have taken the car to the base of the coast, had not the inventor deemed it urgent, for his safety, to turn his locomotive against the end of a house which was by the side of the road. The gable was crushed in, and the ruins fell upon a lot of rabbits which were below, killing some and wounding others. The inventor happily escaped uninjured."

The Wonders of a Watch.

There are very few of the many who carry watches who ever think of the complexity of its delicate mechanism, or of the extraordinary and unceasing labor it performs, and how astonishingly well it bears up and does its duty under what would be considered very shabby treatment in almost any other machinery. There are many who think a watch ought to run and keep good time for years without even a drop of oil, who would not think of running a common piece of machinery a day without oiling, the wheels of which do but a fraction of the service. We were forcibly struck with this thought the other day, upon hearing a person remark that, by way of gratifying his curiosity, he had made a calculation of the revolutions which the wheels in an American watch make in a day and a year. The result of this calculation is as suggestive as it is interesting. For example: The main wheel makes 4 revolutions in 24 hours, or 1,460 in a year; the second or center wheel, 24 revolutions in 24 hours, or 8,760 in a year; the third wheel, 192 in 24 hours, or 69,080 in a year; the fourth wheel (which carries the second-hand), 1,440 in 24 hours, or 525,600 in a year; the fifth, or 'scape wheel, 12,960 in 24 hours, or 4,728,400 revolutions in a year; while the beats or vibrations made in 24 hours are 388,800, or 141,812,000 in a year.—*Lancaster Express.*

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PROGRESS OF PHOTOGRAPHY.

The annual meeting of the American Photographical Society was held at the New York University, on Feb. 8th. The President, Prof. J. W. Draper, delivered an address recounting the most interesting researches and discoveries in photography during the year. We make the following extracts:—

PHOTOGRAPHS OF THE FIXED LINES IN THE SOLAR SPECTRUM.

"To Prof. Joy we are indebted for some valuable statements respecting the possibility of photographing the entire length of the solar spectrum, more especially in its less refrangible spaces—the red, orange, green. There seems to be an impression in Germany that this cannot be done, though it has not only long ago been accomplished in America, but engravings showing the fixed lines in the red and less refrangible spaces have been published. Twenty years ago I published one of the kind. And speaking of these photographs of the fixed lines, I cannot but refer to the great success with which our fellow-member, Mr. Rutherfurd, has been rewarded for his labors in that direction. Certainly it would be difficult to conceive of anything more perfect and beautiful than the specimens he has obtained."

PHOTOGRAPHING IN COLORS.

"Mr. Tillman read a paper on heliochromy, or photography of colors; his object being to show that that problem is as far as ever from a satisfactory solution, and that to prepare a surface of any of the compounds now known to the chemist, which will give back the whole gamut of the permanent colors, is a proposition which should not be seriously entertained. On this subject I may refer to some remarks which will be found in the annual address of last year, on the color-giving properties of the carbon compounds."

THE STAR, "ARCTURUS," A COMPANION OF OUR SUN.

"While speaking of the fixed spectrum lines a moment ago, I ought to have made more special reference to the experiments of Mr. Rutherfurd on such lines in the spectra of the stars, particularly his observation that the star Arcturus shows lines in the same positions as those of our sun—an indication of similarity of constitution between the two bodies, and suggesting that Arcturus is perhaps straying away from its former companion—an idea that seems to be supported by facts connected with the nebular hypothesis, supposing that the two bodies have really the same constitution."

IMPROVED PHOTOMETER WANTED.

"We had a new photometer exhibited by Mr. Everett. It is an improvement on those commonly in use, and is intended more particularly for the comparison of artificial lights. Its indications depend on printed or written letters ceasing to be visible to the eye. They are therefore matters of judgment or opinion. No invention could be more useful in optical science, than that of a photometer which would give its indications in degrees, as a thermometer does in the case of heat, such indications being absolute and not matters of opinion. All persons read the degree at which a thermometer is standing alike, but it is by no means uncommon for two persons to disagree respecting the equal darkness of two shadows, the equal brightness of two lights, or whether a given luminous effect has ceased to be visible. Yet these are the indications to which we resort in the most approved methods for the measurement of light. Moreover, most of our photometers are merely instruments of comparisons. They require a standard light, with which the light to be tried must be contrasted. As yet no such thing as an absolute measure or unit of light has been invented. The nearest approach to it is, I believe, contained in a suggestion formerly made by me—the heating of a piece of platinum by a Voltaic current to a definite temperature as for instance 2,500 degrees. At the same temperature the light is constant, and the temperature can be absolutely determined and even kept uniform by the expansion of the platinum. Until some such principle is adopted, photometers cannot be made to compare with one another. In the meantime the relative value of different kinds of instruments may be estimated by the correspondence of the results they will give, when the same lights are measured in succession by different persons, or in a faithful and unbiased manner by the same person. Tried in this manner the photometer of Mr. Everett compares advantageously with its predecessors."

EFFECT OF DIFFERENT COLORED LIGHT ON PLANTS.

"We owe to Mr. Johnson some very interesting and important experiments on the influence of light on the growth of plants. His attention has been chiefly directed to two points. First, as to whether the germinating or sprouting of seeds is influenced at all by the color of the light that happens to fall on them. This he decides in the negative. Second, when a planet is fairly growing does one kind of light prove to be more favorable to it than another? He shows that of the different colors, yellow, orange, and green are the best; red and violet the worst. His experiments were made in little conservatories covered with selected specimens of colored glass, that had been tested."

DIFFICULTY OF MAKING PERFECT LENSES.

"For a perfect lens something more is needed than a perfect theoretical construction. The suitable curves being ascertained, and suitable glass provided, the mechanical execution involves difficulties infinitely greater than is commonly supposed. I have had myself very extensive opportunities for the critical examination of optical surfaces, not so much for the purpose of ascertaining whether they were good enough for sale, as whether it was possible to make them mathematically correct. You will find it often stated in books that it is the easiest thing to grind and polish for instance a true spherical surface. I can assure you that it is nothing of the kind, and that the best American and European artists cannot form such a surface in which the methods of examination now known and practiced will not find defects. Of all mechanical operations, that of imparting to a piece of glass a determinate and absolutely correct mathematical figure is one of the most difficult and delicate. The most skillful workman and the best constructed machinery can only make uncertain approaches to it. For this reason you can never estimate with the last degree of accuracy the excellence of a class of lenses, said to be constructed upon the same formula. They will differ among one another. The theory of their construction is one thing, the practical execution a different affair."

TRIBUTE TO MR. FITZ.

"I cannot thus refer to the construction of lenses without being led to the mention of our fellow-member, Mr. Fitz, who, in such an unexpected and untimely manner, has been removed from us by death. It is a loss to American science and American art—a loss especially to this society. I presume there was no one in the United States more thoroughly conversant with those difficulties in figuring glass surfaces to which I have alluded, and no one more able to overcome them."

POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The Polytechnic Association held its regular weekly meeting at its room at the Cooper Institute on Thursday evening, March 3d; the President, S. D. Tillman, Esq., in the chair.

The President first read a summary of scientific and industrial news, as follows:—

NEW PLANT FOR PAPER.

"Paper is now made in New Zealand from an indigenous flax—the *phormium tenax*. It is predicted that paper-making will be the staple manufacture of those islands."

PHOSPHORETTED COPPER.

"A submarine cable has just been made at Woolwich, England, for the French Government, 115 nautical miles in length. It is covered with a flexible spiral metallic sheathing of phosphoretted copper—the best copper mixed with 1-400th by weight of phosphorus. It is said that the addition of phosphorus increases the tensile strength of copper, and retards the action of air and sea-water."

NEW EXPLOSIVE COMPOUND.

"If glycerine is treated with nitric and sulphuric acids, as cotton is treated to produce gun-cotton, the product when heated explodes with equal violence. Glycerine is the base of oleine, stearine, &c. It has not been applied to any useful purpose."

Mr. Bartlett—"It has been tried in the place of water in gas-meters."

Mr. Gavitt—"It has been used with glue in making printers' rollers, and promises to answer the purpose very well indeed. I have used it in turning steel, and in mounting microscropic objects."

CORRELATION OF MECHANICAL AND CHEMICAL FORCES.

"The Bakerian lecture before the British Royal Society on this subject, by Henry C. Sorby, contains an account of some interesting experiments made by him relating to the effect of pressure on the solubility of salts. Bunsen and Hopkins had before proved that substances which expand when fused have their point of fusion raised by mechanical pressure. Professor W. Thompson had shown, on the other hand, that water, which expands in freezing, has its point of fusion lowered by pressure, for in this instance mechanical force must be overcome in crystallization. Similar principles hold true with respect to the solubility of salts in water. If, when they dissolve, the total bulk increases, pressure reduces their solubility; on the contrary, if the bulk decreases, pressure makes them more soluble."

PLATE ENGRAVING.

"An improvement for protecting engraved plates has been introduced in France by M. Chardon, which process consists in covering the plate with a very thin layer of iron, by means of the galvano-plastic process. The deposit is so fine that the finest lines of the engraving are found to be exactly copied. When the thin iron stratum becomes worn it can be replaced by plunging the plate in an acid which will dissolve the iron without attacking the copper; and thus the plates may continue to be used for an indefinite period."

Mr. Gavitt—"The papers are continually announcing some new process of engraving; but, so far, none of them have been found to succeed in fine work, such as we employ in bank-note engraving."

The President—"Does not the Coast Survey copy their plates by the galvano-plastic process?"

Mr. Gavitt—"The Coast Survey is very peculiarly situated. The Government expends enormous sums in order to preserve the original plates, and the printing is done only from the electro-plate copies. But even in that case an experienced judge can always distinguish the prints of the original plate from those of the electro-plate copy. They tried me in Washington and I selected them correctly in every case. It is impossible to make as good work on copper plates as on steel. In the skies and other delicate portions the hand of the workman will wear the copper during the process of engraving. The copper, too, wears much more rapidly in printing. A copper plate will not give more than 3,000 very perfect impressions, while a steel plate will give 30,000, and the last of the 30,000 will be better than the last of the 3,000."

SURFACE CONDENSERS.

The regular subject of the evening, "Surface Condensers," was then taken up, and the President called on Mr. Sewell to explain his condenser.

Mr. Sewell—"In my condenser the water passes through the tubes, and the steam occupies the chamber outside of the tubes. We prefer to have the condenser placed immediately below the cylinder, to admit the steam above the pipes, and to take out the water of condensation at the bottom. The water is driven through the pipes by a pump, and we find that it is equally distributed. The vacuum is better than with a jet condenser, and the saving in coal is about 20 per cent. This has been fully proved by actual trials at sea; the experiments extending through a number of days."

Mr. Wood—"What is the thickness of your pipes?"

Mr. Sewell—"They are made of brass, a little more than 1-32d of an inch in thickness. At first they were found to injure the boiler; but, since I have tinned them, there is no difficulty in this respect."

Mr. Fisher—"How long do you make the pipes?"

Mr. Sewell—"I can make them as long as they can be drawn from solid pipes—that is about 9½ feet. Soldered pipes sometimes last quite well, and at other times they give out very quickly indeed. We, therefore, prefer to have them cast in short lengths and then drawn down."

[Sewell's condenser was illustrated in Vol. VI., Scientific American (new series), page 245.]

Mr. Stetson—"There is one theoretical question that I should like to have answered. It is our lot to study books at school which are made up of state-

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ments taken from other books, and a good many of these statements were made a long time ago, and have been copied and re-copied, and have in this way come down to us. When we come to try these statements, we find that a great many of them are incorrect. One of the statements, which is to be found in all the philosophies that I know anything about, is that, if water is deprived of its air, it will not boil at 212°, but may be heated to 240°, 250°, 260°, or 270° above zero before it will boil, and then it will explode. Now, in your surface condenser you get rid of the air the first time you use the water. What I want to know is, whether there is any explosion in consequence?"

Mr. Garvey—"Mr. Chairman, this is not a mere statement of old school-books, but it has been the subject of the most recent investigations. Tyndal, in his work on heat (just published), relates his experiments in connection with the matter, in his examination of the hot springs of Iceland. In evaporating water, the heat must overcome the resistance of three forces—the pressure of the atmosphere or of the steam; the weight of the superincumbent column of water above the point where the heat is applied; and the cohesion of the particles of water to each other. When air is scattered among the particles of water, the cohesion is nearly destroyed, but, if the air is removed, this force is exerted. Vapor, however, produces the same effect as air, and this force of cohesion is not exerted unless the liquid is quiescent."

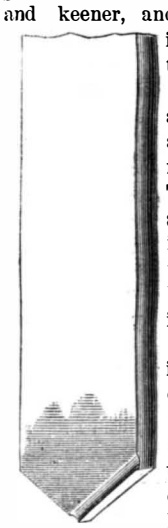
Dr. Rowell—"As soon as the vapor begins to go off, the liquid comes down instantly to 212°."

The subject of "Surface Condensers" was set down to be continued for the next evening, and the Association adjourned.

THE DRILL AND ITS OFFICE.

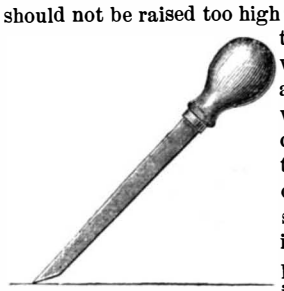
[Continued from page 165.]

For general use a plain drill without lips is as good as any, in fact better. A "lipped" drill cuts faster but gets dull quicker, because the edges are thinner and keener, and require grinding oftener; so it

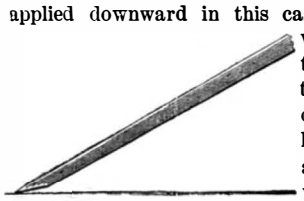


is a question whether it is any better for ordinary use. Where deep holes are to be drilled lips are an advantage, for the chips removed are heavier than the plain drill makes and do not clog so quickly. This is a lipped drill and consists, as mechanics know, in simply making the cutting edges hollow or thinner, so that they take a ranker hold of the metal, just as a plane iron does when pushed out too far.

A great deal depends on grinding a drill; for while the cutting edges may be all right in shape, if they are ground at too quick an angle, they are soon rubbed off on the work and do not perform efefficiently; or if one side is ground longer than the other the hole will not be round. The back part of the cutting edge should not be raised too high; in effect the cutters of



the drill are two chisels which remove the iron as they revolve; now if we were to employ a chisel for cutting wood the angle of inclination of the edges to the work should be such that it would require little pressure to force them in. The tool would not be held thus, but as shown below. The force is not applied downward in this case, but in a plane, as



with a screw-driver; therefore to follow out this illustration, the drill should have but little clearance behind as in this diagram, which is merely intended to show the idea and not as a pattern for a drill edge [right-hand fig.]

Not as some grind them thus [left-hand fig.] A planing tool also furnishes an illustration of this matter, for if

a finishing flat-nosed tool was ground like the last diagram, it would do nothing but chatter, while the first would cut smoothly and without jar. These are the main points of good drills of the ordinary kind, but there are an almost endless variety of them, such as twisted, pin drills, counter-borers, &c., and each and all of these have different shapes to suit different work. It is impossible and unnecessary to go into these at length, and we shall only notice one of each kind mentioned above.

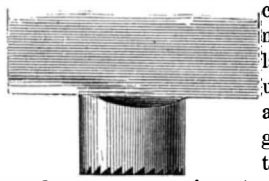
The twisted drill is another kind of boring tool used by machinists, and is deservedly popular with

those who understand its construction; this is a twist drill. It has the advantage of clearing itself more easily in large sizes than a flat drill, for the cuttings or chips are raised out of the hole by the action of the threads or spiral part of the body. It is also a singular fact that this drill feeds with more ease than an ordinary drill; whether this be owing in any measure to the action of the twisted part in drawing the tool down is a matter of very great doubt, though this view is entertained by many excellent machinists; it is our own opinion that the twisted drill runs better than a straight one in deep holes, from the fact that the point and cutting edges are always clear, and at a reasonable depth it cuts as well as when first started. Be this as it may it is important that the twists should be regular and even; *it is of the first importance*, next to the edges, for the truer they are, the more perfect will be the execution. In certain small sizes of these drills the shaft is turned like a common rod in the lathe and afterwards milled on a milling machine so as to have true rooves from end to end. The velocity with which these little drills work, or the actual duty they accomplish estimated by positive linear measurement is astonishing; we recently saw one in an armory, drilling cones, which had cut over 150 feet in steel without being ground or tempered; also some in the Waltham Watch Factory, which had shown equally good endurance. For large twist drills the plan pursued in their construction is simply to take a steel bar and draw it down on the anvil to the proper size. This bar is then heated as hot as possible without burning it, and one end inserted in a vice. If the end of the bar has been squared as it should have been, it is only necessary to put a wrench on the square and apply force by hand as shown in the engraving. The tool is then formed, but if the twists

are not even they must be corrected as far as possible on the anvil. The best way to make such drills would be to devise a machine for this purpose, and we throw out this hint for such as are disposed to act upon it. Twist drills for the trade ought to be sold just as cheaply as augers for carpenters, and it would doubtless prove a profitable speculation for some one to embark in. Even if the larger and heavier sizes of drills were not thus made—that is, by contract—the smaller ones might be, with promise of profit. If we are not greatly mistaken, some shrewd mechanic addressed us on this very subject.

Here is a pin drill, some call it a counter-borer, but

this is not a term which can be applied indiscriminately, for in some jobs the tool is used wholly as a drill and not as a cutter or tool to counter-bore, or drill against certain other holes. The use of this tool is to drill large holes more correctly and faster than a single drill could do it, and it is used the same as any other drill, with this exception, a hole must have previously been made for the "tit" or pin, in the work to be done. If this first hole is not straight the pin drill will not go straight, for the pin follows the first hole, which is usually small, in about the same proportion as the diagram. The first hole acts merely as a guide for the pin, and when it is made true the pin drill follows in it and takes out great curling chips of metal with the greatest facility. The pin should have very little clearance in the first hole, so that it cannot shake about, and the first hole is sometimes a trifle smaller, and the "tit" on the drill is serrated as shown below, so that it clears itself as it goes down and always fits snugly. If the first hole drilled in the work is too large, the pin-drill goes all over and neither makes a round hole or a true one. These drills are



costly to make, as they must be turned in the lathe and afterwards filed up, since from the conformation they cannot be ground on the stone, although they may be sharpened on a true running stone when held by a steady hand.

There is an endless variety of counter-borers or pin-drills adapted to every class of work, but as the principle is the main thing, it is not necessary to follow or to illustrate every one. The counter-borer in one shape is used to cut out the tube holes in flue sheets, which in boilers as lately built require a great deal of time, and if the tool is not properly made many sizes are required in large shops where much work is done. This subject will be alluded to in our next article.

IMPROVEMENTS AT THE WASHINGTON NAVY YARD.—Work on the mammoth gun-foundry will soon be renewed and pushed to a speedy close. The building at one time occupied as a painters' department is being re-fitted and put in condition to become a receptacle for naval trophies, and specimens of engineering, and ordinance and arms waiting trial. The introduction of the Potomac water in unlimited quantity has rendered unnecessary the reservoir, built a few years since convenient to the principal entrance, and which was computed to hold three hundred thousand gallons; this structure has been removed, and buildings for officers' quarters are to be erected on its site. In addition to these improvements, the avenues of the yard are to be flagged with Belgian block pavement, which will give the place a neat and compact appearance.

A GERMAN who had fifty dollars in gold in a drawer in his work-bench, in Colt's armory, had to leave it there at the breaking out of the fire. On digging in the debris, near the spot where his bench stood, the gold was found, last week, melted into on e nugget.

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FARMERS' CLUB.

At the regular weekly meeting of the Club, on Tuesday, March 8th, 1864, a large number of miscellaneous subjects were discussed, from which we select the following items.

LIVE ARCHED GATE-POSTS.

Mr. Robinson read a letter from a correspondent in Wisconsin, giving an account of some beech-trees which had grafted themselves together naturally. One pair stood several feet apart at the root, and, from the point where they united, they formed one smooth trunk with a single top. In another case, a pair of beech-trees had grafted themselves together, and one of them had rotted off below the junction, being supported by the other. The sap from the perfect tree circulates through the one that is suspended, and keeps it alive, even below the point of intersection. The writer suggested that small trees might be set out for gate-posts, and brought together at the proper hight to make an arch over the gate, where they could be united by grafting or "in-arching," as it is technically called, thus making a permanent, beautiful and curious gate-way.

Mr. Veeder remarked that the elm was peculiarly suitable for in-arching.

MAKING FLOWERS DOUBLE.

A young lady, in Central New York, wrote to the Club, saying, that some of her balsam and aster plants produced flowers very double, while on other plants the flowers were all single, and asking if the Club could tell her how to have all her flowers double.

Mr. Pardee said: "Mr. President, the remedy for this difficulty is simple and effectual. When a plant produces a flower with a single row of petals, it must be inexorably torn up by the roots, and trampled in the path. Balsams, pinks, asters, and all that class of plants are apt to have seeds which will produce plants that will bear single flowers; and if the pollen from these is allowed to fructify the flowers of other plants, the whole bed will be hibridized, and the following year a crop of inferior flowers will be produced. On the other hand, if the plants that bear single flowers are firmly sacrificed, the seed will improve, and frequently very fine and curious flowers will be obtained."

KEEPING GRAPES.

Mr. Carpenter presented a box of Isabella grapes for distribution to the meeting. He stated that the person who raised them is sending to market now from 15 to 50 boxes weekly.

Mr. Pardee remarked that he had tried many plans for preserving grapes, and had found that the best method is, to gather the grapes between three and four o'clock in the afternoon of a dry day, taking great care to have them all ripe, and none over-ripe, cutting out all imperfect berries. Then spread them on a floor for a few days, after which they are to be put in boxes with a little cotton, and placed in a cool, dry room.

TWO KINDS OF RED CLOVER.

An earnest discussion has run through several meetings of the Club on the subject of two kinds of red clover. The conclusion seems to be, that there are two kinds; that the large kind is far the more productive and valuable, but that the small kind is usually cultivated for seed, so that nearly all the seed in market is of the small variety. The seed of the two varieties is so nearly alike that it is impossible to distinguish one from the other. The small variety ripens the last of June or first of July, and, if then mowed, produces a second crop. The large variety ripens a month later, and yields but one crop in a year.

Amendments to the National Banking Law.

The principal amendments proposed to the National Banking Acts by the Comptroller of the Currency, which were recently sent to the Ways and Means Committee, and referred to a sub-committee for examination, are as follows:—

National Banks are to be required to redeem their circulating notes in the city of New York, at a small discount. A uniform rate of interest (7 per cent) is to be established througout the United States for National Banks.

The lawful money reserve that is to be kept on hand is to be reduced from 25 to 15 per cent for country banks, and from 25 to 20 per cent for city banks. Provision is also made for the closing of banks whenever the owners of two-thirds of the capital stock shall deem it expedient.

Banks cannot be organized with a less capital than $100,000 in the country, nor with a less capital than $200,000 in cities.

It will be made imperative that an amount of bonds, equal to one-third of the capital stock, paid up, shall be kept on deposit with the Treasurer of the United States, whether banks take circulation for them or not.

CASTING OF A GREAT GUN.—OFFICIAL REPORT.

We have received the following official report from the Ordnance Bureau:—

To Commander H. A. Wise, U. S. N.,

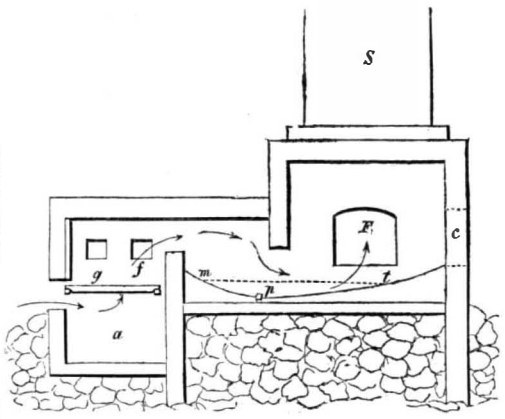
Chief of Bureau of Ordnance, Washington, D. C.

Sir:—I have the honor to report that, in obedience to your order of the 6th inst., I proceeded to Pittsburgh, Pa., and was present at the casting of the 20-inch gun for the Army, at the Fort Pitt Foundry. The casting took place on the 11th inst., and was most successfully performed. I beg to submit the following report of the operation:—

I found the furnaces ready charged, and the mold in the pit on my arrival. Five furnaces were prepared, charged with 105 tuns of iron, in the following order, commencing with the one nearest the pit:—No. 1, 23 tuns; No. 2, 23 tuns; No. 3, 39 tuns; No. 4, 10 tuns; No. 5, 10 tuns; total, 105 tuns, or 235,200 pounds; the iron used being all "Juniata," charcoal warm-blast iron, from the Bloomfield and Rodman furnaces, second fusion.

The mold was of a cylindrical form, made in four pieces, and was prepared with a cast-iron core on Major Rodman's plan.

The furnaces were what are termed "reverberatory air furnaces," and so constructed that the metal, as it melted, ran towards the flame. The accompanying



sketch shows a vertical longitudinal section of one of them:—*a*, is the ash-pit; *g*, the grate bars; *f*, fuel chamber; *p*, tap-hole; *c*, charging door; F, the flue; S, the stack; and the dotted line, *m t*, shows the surface of the metal when melted. Troughs were arranged to conduct the melted metal from the three principal furnaces to a receiver or pool, near the pit, from which it flowed in two streams into the mold, entering it at the bottom—the points of entrance being exactly opposite each other—with openings, or "gates" at different distances, for the metal to flow through as it rose in the mold. The largest furnace —No. 3—was 54 feet from the pool; No. 2, about 25 feet, and No. 1, about 20 feet.

The fuel used was Pittsburgh bituminous coal, and in the proportion of 18 bushels to one tun of iron.

The furnaces were all lighted at 5 A. M.; weather very fine; wind west. At 11 A. M., the metal was completely fused; and it was kept in fusion for 1*h*. 24*m*. At 12*h*. 1*m*. water was admitted into the core, its rate of flow being 30 gallons per minute; temperature 36°; temperature of air outside of the foundry 28°. At 12*h*. 24*m*. the three large furnaces, Nos. 3, 2, 1, were tapped in succession, and the filling of the mold commenced, furnaces Nos. 4 and 5 being held in reserve.

At 12*h*. 46*m*. the mold was filled; the temperature of water at the waste pipe being 42°; at 12*h*. 50*m*. it was 32°; at 12*h*. 58*m*. it was 65½°; at 1*h*. 4*m*. it was 81½°; at 1*h*. 20*m*. it was 89½°; at 1*h*. 25*m*. it was 91°; at 1*h*. 31*m*. it was 91¾°.

At 1*h*. 46*m*. the flow of water was increased to 60 gallons per minute; the temperature at the wast pipe then fell to 70½°, at which it continued withou change for two hours. At 6 P. M., the temperatur of the water was 68½°; at 11 P. M., 61°; at 4 A. M. 57½°; at 9 A. M., 57¼°; at 10.20 A. M., 57°, at which time the flow of water was stopped. In a few minutes after the water remaining in the core commenced to boil, and passed of rapidly in steam.

After the mold had been first filled, it became necessary to add to the sinking head, to compensate for the settling of the metal. This was done by means of ladles, and the surface was then covered with charcoal to prevent cooling too rapidly.

At 3.45 P. M., of the 11th, a fire of wood and coal was lighted in the pit around the flask, and was kept burning during the time I was present. February 12th, at 2*h*. 45*m*. P. M., all the water and steam having been expelled from the core, it was withdrawn; no difficulty occurring in doing so.

The quality of iron being considered rather high, it was deemed advisable to continue the cooling by the introduction of air into the bore instead of water; and accordingly, immediately after the removal of the core, a stream of air was introduced by means of a blast through a pipe passing to the bottom of the bore. Temperature of the air 57°. Its rate of flow was not determined before my departure, though steps were being taken for doing so. This current of air is to continue until the gun is entirely cooled.

The casting of this great piece of ordnance having been thus successfully accomplished, as far as it is possible to determine, until its removal from the pit—that event not being likely to occur for eight or ten days—I considered my presence no longer necessary, and accordingly returned to this place, in obedience to your orders. The whole operation was conducted in the most satisfactory manner, without accident or delay of any kind, and reflects the highest credit upon all those who were charged with its execution; so that should it be determined to cast a similar gun for the navy, every assurance has been given that it would be successfully accomplished.

Your obedient servant,

R. Aulick, U. S. N., Assistant Chief of Bureau.

Washington, D. C., Feb. 16, 1864.

The "Scientific American" as a Medium for Promulgating Inventions.

Messrs. Editors:—You may remember that, in your issue of March 12th [page 168], you published a beautiful illustration of my Knife-cleaner. I was prepared to hear from parties interested in about one week, and had made arrangements accordingly. The Scientific American is, I believe, published every Saturday; and you may judge of my surprise when, upon the Monday ensuing, several individuals haunted my place of business in quest of the article alluded to. This is much quicker than I anticipated; and I have no doubt but that the parties would have appeared on Sunday had it been a business day. I am delighted with the manner in which you have transacted my business; and I shall not only forward several other improvements that I have in contemplation, but endeavor to increase the circulation of your most valuable journal by all means in my power.

J. H. Van R.

New York City, March 9, 1864.

The Best Varieties of Apples and Pears.

At the meeting of the Fruit Grower's Society of Western New York, Jan. 28, 1864, votes were taken on the 14 best varieties of pears for family use, with the following result, 21 votes being cast :—

Bartlett	21	Belle Lucrative	16
Angouleme	18	Beurre Giffard	14
Louise Bonne	17	Beurre Anjou	14
Sheldon	17	Rostiezer	12
Lawrence	17	Flemish Beauty	12
Doyenne d'Ete	17	Winter Nelis	12
Seckel	16	Beurre Bosc	11

Upon the results of the past very favorable season, the following vote on the best six varieties of apples for winter market was had:—

Rhode Island Greening	13	Northern Spy	6
Roxbury Russett	13	Golden Russet	7
Tompkins County King	13	Baldwin	14

The Atlantic Telegraph Cable to be carried in the "Great Eastern."—A telegram has been received from Mr. Cyrus W. Field (who is now in London), stating that Messrs. Glass, Elliot & Co. have chartered the *Great Eastern* for laying the Atlantic telegraph cable in 1865.

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The Value of Courtesy.

A few years ago, two men, who from their conversation, appeared to be foreigners, stopped before the gate of one of our large workshops (in Boston) for the manufacture of locomotive engines. Entering a small office, the elder of the two men inquired of the superintendent in attendance if he would permit them to inspect the works.

"You can pass in and look about if you choose," said the superintendent, vexed, apparently, at being interrupted in the perusal of his newspaper. He then scanned the two strangers more closely. They were respectably but plainly dressed, and evidently made no pretentions to official dignity of any kind.

"Is there any one who can show us over the establishment, and explain matters to us?" asked Mr. Wolfe, the elder of the strangers.

"You must pick your own way, gentlemen, replied the superintendent; "we are all too busy to attend to every party that comes along. I'll thank you not to interrupt the workmen by asking questions."

It was not so much the matter as the manner of his reply that was offensive to Mr. Wolfe, and his companion. It was spoken with a certain official assumption of superiority, mingled with contempt for the visitors, indicating a haughty and selfish temper.

"I think we will not trouble you." said Mr. Wolfe, bowing; and taking his companion's arm they passed out.

"If there is anything I dislike it is incivility," said Mr. Wolfe to his companion, when they were in the street. "I do not blame the man for not wishing to see us over his establishment; he is no doubt annoyed and interrupted by many heedless visitors; but he might have dismissed us with courtesy. He might have sent us away better content with a gracious refusal than with an ungracious consent."

"Perhaps we shall have better luck here," said the other stranger, and they stopped before another workshop of a similar kind. They were received by a brisk little man, the head clerk, apparently, who, in reply to their request to be shown over the establishment, answered, "Oh, yes, come with me, gentlemen; this way!" So saying, he hurried them along the area strewn with iron bars, broken and rusty wheels of iron, fragments of old cylinders, into the principal workshop. Here, without stopping to explain any one thing, he led the strangers along with the evident intention of getting rid of them as soon as possible. When they paused where the workmen were riveting the external castings of a boiler, the clerk looked at his watch, tapped his right foot against an iron tube, and showed other signs of impatience. Whereupon Mr. Wolfe remarked: "We will not detain you any longer, sir," and with his friend took leave.

"This man is an improvement on the other," said Mr. Wolfe; "but all the civility he has is on the surface; it does not come from the heart. We must look further."

The strangers walked on for nearly half a mile in silence, when one of them pointed to a picture of a locomotive engine with a train of cars underneath. It overtopped a small building not more than ten feet in height, communicating with a yard and workshop.

"Look," said the observer, "here is a machinist whose name is not on our list."

"Probably it was thought too small a concern for our purpose," said his companion.

"Nevertheless, let us try it," said Mr. Wolfe.

They entered and found at the desk a middle-aged man, whose somewhat grimy aspect and apron around his waist showed that he divided his labors between the workshop and counting-room.

"We wish to look over your works, sir, if you have no objection."

"It will give me great pleasure to show you all there is to be seen," said the mechanic, with a pleased alacrity, ringing a bell, and telling the boy who entered to take charge of the office. He then led the way, and explained to the strangers the whole process of constructing a locomotive engine. He showed them how the various parts of the machinery were manufactured, and patiently answered all their questions. He told them of an improved mode of tubing boilers, by which the power of generating steam was increased, and showed with what care he provided for security from bursting. Two hours passed away. The strangers were delighted with the intelligence displayed by the mechanic, and with his frank, attentive and unsuspicious manners.

"Here is a man who loves his profession so well, that he takes pleasure in explaining its mysteries to all who can understand them," thought Mr. Wolfe.

"I am afraid we have given you a good deal of trouble," said the other stranger.

"Indeed, gentlemen, I have enjoyed your visit," said the mechanic, "and shall be glad to see you again."

"Perhaps you may," said Mr. Wolfe, and the strangers departed.

Five months afterward, as the mechanic, whose means were quite limited, sat in his office, meditating how hard it was to get business by the side of such large establishments as were his competitors, the two strangers entered. He gave them a hearty welcome, handed chairs, and sat down.

"We come," said Mr. Wolfe, "with a proposition from the Emperor of Russia."

"From the Emperor? Impossible!"

"Here are our credentials."

"But, gentlemen," said the now-agitated mechanic, "what does this mean? How have I earned such an honor?"

"Simply by your straightforward courtesy and frankness, combined with professional intelligence," said Mr. Wolfe. "Because we were strangers, you did not think it necessary to treat us with distrust or coldness. You saw we were in earnest in acquainting ourselves with your works, and did not ask--before extending to us your civilities—what letters of introduction we brought. You measured us by the spirit we showed, and not by the dignities we could have exhibited."

The mechanic visited St. Petersburg, and soon after removed his whole establishment there. He had imperial orders for as many locomotive engines as he could construct. He has lately returned to his own country and is still receiving large pecuniary returns from his Russian workshop. All this prosperity grew out of his unselfish civility to two strangers, one of whom was the secret agent of the Czar of Russia.—*Exchange.*

[There is much more truth than imagination in this little sketch; and our own experience convinces us that it is only too correct. Engineers are too often curt and surly in their replies to interrogatories; and some few rude and discourteous men have in this way cast a reproach upon the whole profession. Blunt speech does not make a man any "smarter" in his calling; and he will lose nothing himself by imparting information to others who are ignorant; nay, the true engineer takes pride in his knowledge and is glad of an opportunity to explain the mysteries of steam to those who appreciate it. There is no "smartness" in telling some youth who seeks after knowledge that the shaft is the piston-rod, or that the boiler is the cylinder; and no one would be guilty of it but a shallow-brained fellow who is no ornament to his calling. Engineers are not the only ones in the world who are sometimes discourteous, and the writer of the above sketch might have made a wider application of his lesson. The truth of it, however, is undeniable and should be remembered.—EDS.

The Turpentine and Rosin Business of California.

Messrs. Hucks & Lambert furnish the following in reference to the manufacture of California turpentine and rosin, as mainly correct:—We have been deeply interested in this business from its commencement, and have purchased over two-thirds of all the rosin made; and for our purpose it has been found to far excel in quality the rosin from the Eastern States. The quantity of "crude gum" collected in Butte and Sierra counties from the beginning of March till the end of November was, more or less, 350,000 pounds. From this has been manufactured 7,250 gallons of spirits of turpentine; and boxes and barrels of rosin equal to 1,150 barrels, of an average weight of 250 pounds.

There have been three distilleries in operation during the season. J. L. Gibson, of Forbestown, Butte county, has produced from his still over 3,000 gallons of turpentine, and 500 barrels or boxes of rosin. The balance has been manufactured partly by John Hart, of Marysville (lately deceased), and by Jacobson & Co., of the same place, who are still operating.

In conclusion, we would say there will be a wide field open for this particular branch of home manufacture, as evidenced by the countless acres of pine forests abounding all over the foot-hills of the Sierra Nevada; and which are, no doubt, destined to give future employment to thousands.—*Alta California.*

The Most Profitable Variety of Potato.

At a recent meeting of the Farmers' Club of the American Institute, Mr. Carpenter gave his experience with Goodrich's potatoes. He said that he had cultivated all four varieties, and he believed that the Cusco-white, with good culture, would yield 300 bushels to the acre.

Mr. Williams said that in 1862 he tried all four varieties in comparison with some of the best old kinds, carefully measured the ground and the crop, and having his note-book with him he could give the results. The ground, manuring and culture were the same in all cases. The rate per acre of the yield was:—

Prince Albert.....	86 bushels 6 quarts.
Jersey Mercer.....	91 bushels 18 quarts.
Nova Scotia.....	163 bushels 20 quarts.
Peach-blow.....	114 bushels 3 quarts.
Garner-Chili.....	120 bushels 3 quarts.
Coppermine.....	199 bushels 2 quarts.
Rusty-coat.....	216 bushels 6 quarts.
Cusco.....	240 bushels 7 quarts.

The last four are Goodrich's.

Mr. Williams thought that the Cusco surpassed all other varieties of potato in the abundance of its yield, and though in quality it was not perhaps quite equal to the Mercer, it brought the same price in the Newark market.

"Shunt" Rifling.

This phrase has been used a great deal of late in connection with English ordnance, and some correspondents have written to us asking its meaning. The word "shunt" is the English term applied to a railway switch or the rails that convey trains from one track to another. As applied to the rifling of guns, it does not appear to have any peculiar property and is a mere slang word adopted by the inventor of the Armstrong gun. The *Mechanics' Magazine* says:—"The term 'shunt,' is a conceit of Sir W. Armstrong's, meant to convey the idea that the projectile shifts from one set of grooves to another. But that is not the case. The ribs on the projectile, when the charge explodes, jump from the driving to the bearing sides of the grooves, just the same as all rib-rifled or mechanically-fitting projectiles do. The rifling consists of ten grooves in the bore, and ten corresponding ribs in the shot. To the ribs zinc studs, six to each rib, are affixed on the bearing sides. Yielding to the pressure of the gas, the soft metal studs are intended to equalize the friction of the bearing surfaces, and relieve the gun from the strain which might arise from inequalities of the surfaces in contact, as the projectile passes through the bore. What the merit of this description of rifling may be, yet remains to be proved."

Cultivation of Cotton in France.

We translate the following paragraph from the *Moniteur des Brevets d'Inventions:*—

"The trial of the culture of cotton has been made with a veritable success in Camargue, in the lands of the Chateau of Avignon, the most vast of the domains of the territory of Arles. Among the bolls of cotton gathered some have the long staple and others the short. The essay, made on a small scale and in the open air, has perfectly succeeded. At the end of November the plants were yet covered with a great number of bolls which continued to ripen, though very slowly. Those gathered in August, September and October were very well matured."

It will be remembered that the southern boundary of France is further north than the city of New York.

Exports of California.

The *Alta California*, of San Francisco, says:—"The exports of the productions of the State, during the past three years, may be classified as follows:—

	1861.	1862.	1863.
Products of the Mine.....	$42,103,193	$44,105,662	$47,982,398
Products of Agriculture...	3,265,471	1,645,360	2,013,975
Products of the Herd.....	1,041,217	2,027,082	
Products of the Forest.....	69,931	149,560	134,086
Products of the Sea.....	21,828	21,868	11,285
Products of Manufacture..	962,876	798,191	873,854
Products of the Vine.....	8,000	25,836	81,456
Total.....	$47,472,516	$48,773,559	$53,299,219

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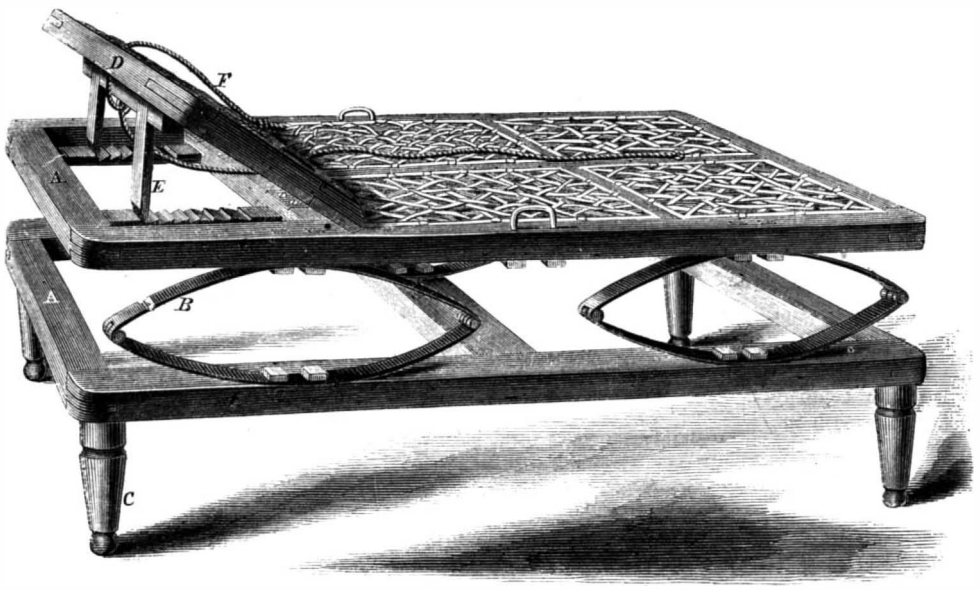
Bolster and Spring Bed-bottom.

The engraving published herewith represents a new arrangement for the construction of a spring bed and adjustable head piece or bolster. This spring bed-bottom consists of two wooden frames, A A, one above the other, the top one being supported by elliptic springs, B, two on each side. The bottom frame has legs, C, which may be taken off if necessary, and the upper one has a secondary frame, D, connected to it by a hinge; on the under side of this second frame there are hung two bars, E, which swing back and forth easily; below these bars there are a series of teeth into which they fit, thus sustaining the bolster, as shown. The cord, F, has two ends and is attached to these bars, so that by pulling it one way or the other the bars are either drawn in or pushed out, thus varying the angle at which the bolster is inclined. The upper frame is covered with cane, like an ordinary chair seat, and it forms a cool resting place in summer time. The legs can be unscrewed and a mattress placed on this upper frame, thus serving for a bed; the springs are very elastic and durable, and will last a long time without repair or adjustment.



FREY'S BOLSTER AND SPRING BED-BOTTOM.

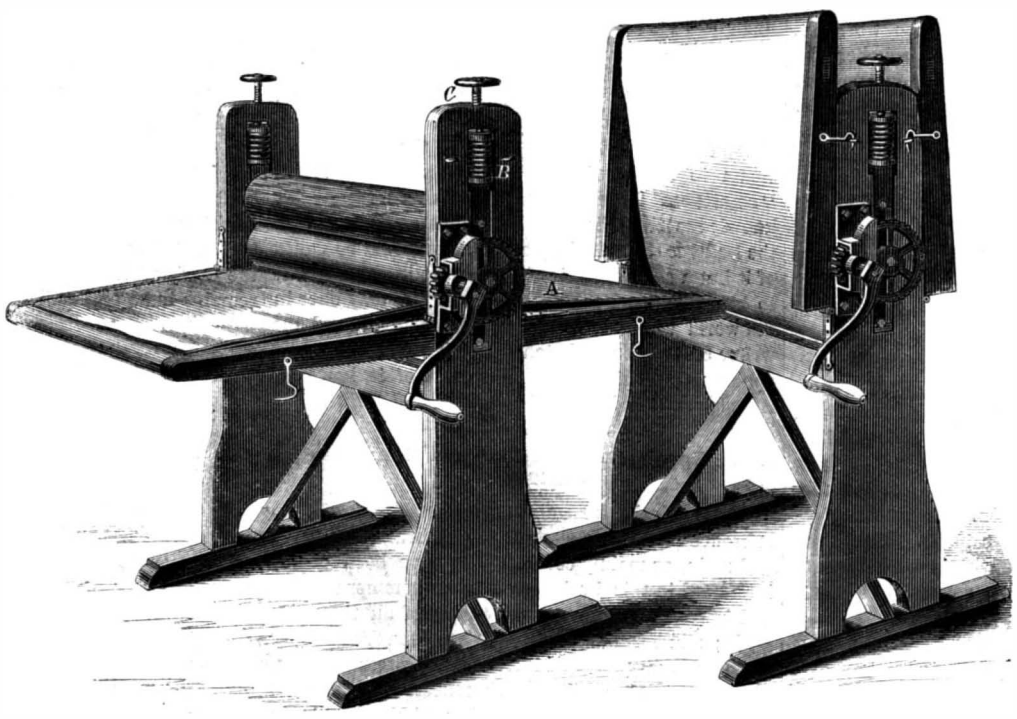
This piece of furniture is a very convenient one and was patented on Dec. 8, 1863, through the Scientific American Patent Agency, by George Frey, of New York city. The entire patent is for sale on reasonable terms, as the patentee is about to leave this country for Europe. For further information address A. Scheller, at 370 Bowery, New York.

Improved Mangling Machine.

Since clothes-wringers and washing machines have become so popular with housekeepers, an increased demand has arisen for an ironing machine, so that the duties of the laundry can be wholly accomplished by mechanical aid. In the engraving published we have represented a new machine of this kind which is said, by those competent to judge, to be the very thing required, as it combines ease of operation, compactness of form and general efficiency in a marked manner.

The endless apron, A, in connection with the detached apron, carries the article to be smoothed between the rollers, B, and around them back to the operator again, so that no walking back and forth from one end of the machine to the other is required. The arrangement of the aprons is such that two sets of articles may be smoothed at once; this is accomplished by placing one set between the aprons and the other upon the same; the mechanical adjustment of the roller is such that even with this double load the machine can be run more easily by one person than two can operate the old-fashioned mangle. No skill is required to operate this mangle; any person strong enough to turn the crank is competent to work it, and the articles o be smoothed are fed up to the rollers on the aprons with much greater accuracy and with less liability of derangement than when fed by hand, as in the old mangles.

Very heavy articles, such as sheets and blankets, can be smoothed quite as readily as lighter ones, and they remain longer in the mangle, being carried round the under roller several times, so as to be fully acted on. The pressure of one roll upon the other is regulated by the springs, B, the set of which is determined by the screws, C; these can be adjusted for the finest or coarsest fabric. Another peculiarity in this mangle is its compactness, a most desirable quality in household utensils. The figure at the right shows the mangle folded up so as to occupy a small space; this feature in connection with the chest-of-drawers which may be fitted to it gives an additional value. It must be borne in mind that no fuel is required in "ironing," with this machine, the gloss or finish being given by pressure alone. This invention is covered by two patents dated May 20, 1862, and Sept. 22, 1863. State rights for the sale of this machine can be had by addressing Alex. M. Lesley, 494 Broadway, New York, where also the mangle may be seen.



A NEW MANGLING MACHINE.

In England there are sixty-two individuals to every hundred acres; in Ireland but thirty-four. In British North America there is but one person to the square mile.

Glycerine for Filling Gas-meters.

We find the following in the *American Gas-Light Journal* :—"The recent cold weather which was felt with such severity, particularly in the Western States, gave a practical exemplification of the necessity for a fluid for filling wet gas-meters which will not congeal. We have recently been shown samples of glycerine manufactured by Messrs. Hartman & Laist, of Cincinnati, Ohio, which will stand the most severe cold ever experienced in this climate, and yet preserve perfect mobility and limpidity. The samples brought to our notice were beautifully clear—almost colorless and odorless; and as the efficacy of this substance has been fully proved, gas companies should avail themselves of it, instead of whisky and other deleterious fluids commonly employed. Glycerine, in a pure state, is perfectly inert, and exercises no influence upon the metals of which the meter is composed. Whisky, on the contrary, undergoes the acetous fermentation, by which the alcohol is converted into acetic acid, which exerts a corroding effect on the meter, and soon wears it out. The price of Messrs. Hartman & Laist's glycerine is remarkably low—much below that of the commonest whisky."

Armor Plates.

We find the following in the London *Engineer* :—

"Upward of 300 tuns of the new description of armor-plates have been landed at Chatham Dockyard, the whole of which have been sent in by Messrs. John Brown & Co., Atlas Works, Sheffield, and by the Millwall Iron Company. The plates are all intended for the iron frigate *Bellerophon*, and the iron-clad frigate *Lord Warden*, both of which are now in hand. The armor plates already received for the *Bellerophon*, are 6 inches in thickness, and 16 feet 1 inch in length by 4 feet 1½ inch in breadth, and their weight is between 6 and 7 tuns. The *Lord Warden* plates are 5½ inches in thickness. The quantity of armor-plating required for the two new iron frigates at Chatham will exceed 2,000 tuns, and in anticipation of an increased demand on the factory establishment a quantity of new machinery, larger and more powerful than any hitherto in use at either of the royal dockyards, is being erected to be used in preparing the enormous slabs of iron which will be used in encasing the *Bellerophon* and the *Lord Warden*. Several weeks have been lost in laying the keel of the *Bellerophon* in the dock in which she is to be constructed, in consequence of the works at the dock entrance not being sufficiently advanced for fixing the new iron caisson."

By a mistake in signals, at the Hoosac Tunnel, the other day, a gang of men, 360 feet below ground, were not pulled up when they fired off a blast, but were exposed to a rocky cannonade. They escaped with a fright and a few bruises.

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NEW YORK, SATURDAY, MARCH 19, 1864.

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WHAT IS MEANT BY THE CONSERVATION OF FORCE.

It a boy snaps one marble against another of the same weight with such precision of aim that the two come in contact exactly in line of their centers, the marble that is snapped will stop in place of the other, while the one that is hit will move forward with the same velocity as the first and in the same direction. The marble first set in motion loses its force, but this force is not destroyed, it is transferred to the other marble, and is thus preserved—or conserved. As action and reaction are equal, it is held as a self-evident truth, that matter once in motion can be stopped only by setting some other matter in motion, and this principle is called the conservation of force.

This doctrine is now generally associated with that of the mechanical theory of heat. It is supposed that the universe is filled with an extremely subtle fluid, imperceptible except through its vibrations to any of our senses. The theory further imagines that the minute particles of this fluid have vibrating motions of various kinds. If we fasten one end of a clothes-line to a post, and take hold of the other end and shake it up and down, we shall see undulations or waves run along the line. The several particles of which the cord is composed do not move in the direction in which the waves move, but while each wave starts at one end of the rope and runs to the other, any given inch of the rope simply vibrates up and down. If we shake the end of the cord horizontally, we shall produce vibrations in a different direction; and if we whirl the end around in a circle, we shall produce those of a still different character, the waves will be apparently spiral, though each particle of the rope will be revolving in a small orbit. There are other kinds of waves conceivable in the particles of fluid which cannot be represented by a rope.

Now, the theory is, that one kind of vibration in the etherial fluid produces the effects and the phenomena which we call heat; another kind light; another electricity, another magnetism; and another chemical affinity. It is supposed that when heat is converted into electricity, the peculiar vibrations which affect our senses as heat are stopped, and that in stopping they start those vibrations which we recognize as electricity.

It is also supposed that when a body is heated, the heat vibrations of the etherial fluid are imparted to the several atoms or molecules of the heated body. And, as all the substances with which we are acquainted are more or less warmed, it would follow that all of their particles are in continual motion. In the same way, when a body is electrified, its particles are presumed to receive the electric vibrations.

The fact that light, heat, electricity, magnetism, chemical affinity, and mechanical force are all mutually convertible one into another, is one of the strong arguments in favor of the truth of this theory.

This theory is the most comprehensive that has ever been conceived by the mind of man. It proclaims that all of the varied and complex phenomena of the universe, from the revolutions of the nebulæ to the growth of a lily, result from the single fact, that matter has got in motion and cannot stop It recognises but one force in the universe, *vis viva*, or the force of moving bodies. It also suggests the possibility of explaining all phenomena, leaving one circumstance only beyond the pale of human knowledge —what it was that first set matter in motion.

BREECH-LOADING SMALL-ARMS.

There is no subject of more pressing or of more lasting importance to the Government and people of this country than the arming of our infantry with breech-loading rifles. It was the great aim of Napoleon Bonaparte to train his soldiers to very rapid loading and firing; and able military critics attribute to his success in this effort the irresistible power of his armies. Experience, however, has developed the astounding fact that, when soldiers load and fire in such haste, their aim is so careless that they do not hit a whole regiment once in 200 shots!

Now, a breech-loading rifle can be loaded and fired more than 30 times faster than a muzzle-loader, and it can be fired at least five times more frequently with all of the movements made with the utmost deliberation. It is altogether probable that a soldier with a breech-loading rifle will fire 5 times as many shots in an hour as one with a muzzle-loader, and that 10 times as many of the shots will prove effective —thus increasing the offensive power of the soldier 50 fold.

The superiority of breech-loading small-arms, so manifest in theory, has been confirmed by large and varied experience. The Spencer, the Burnside, and other breech-loading rifles have been extensively used in this war, and have everywhere won the warmest approval of both officers and privates.

The nation is making very great efforts, and expending enormous sums of money to send additional hundreds of thousands of men to our armies. Every one of these soldiers, when ready for service, costs very nearly $1,000. By the expenditure of $5 or $10 additional for his gun, one-half or one-third of the number of soldiers would be equally efficient.

We should like to see sufficient judgment and decision at the head of the War Department to stop, at once, the manufacture of muzzle-loading small-arms, and to devote the whole power of our armories to the production of breech-loading rifles.

THE METROPOLITAN FAIR.

This truly noble project is, we are happy to say, in a healthy state of progress; the brilliancy of the opening ceremonies will, no doubt, exceed anything of the kind ever seen in this city, not excepting those of the Crystal Palace. Contributions of all kinds are rapidly coming into the hands of the Committee. The workmen of the Novelty Works (and doubtless of other shops also) have set apart the proceeds of one days' labor as a free-will gift to their suffering comrades-in-arms; and as the number of workmen is large, the sum collected in this way will be no insignificant item. It is the intention to make the Machinery Department as extensive and attractive as possible; and it is hoped that every one concerned in this branch of trade, whether as a dealer or producer, will forward a creditable specimen of his wares. Those who have machines of a novel character will bear in mind that the machinery is to be shown *in motion*, which will very much enhance its appearance. The Committee on Machinery consists of the following gentlemen, and if any of them are notified, they will send for the articles intended to be contributed: —Wm. Sewell, 64 Courtland street; Joseph Crampton, 226 West 18th street; W. E. Everett, Novelty Works; J. B. Root, at J. L. Jackson's Iron Works, 28th street and 2nd avenue; W. D. Andrews, 414 Water street; W. E. Worthen, 137 McDougal street; C. Roome, 4 Irving Place; J. R. Floyd, 744 Greenwich street; Horatio Allen, Novelty Works; T. F. Secor, Allaire Works; A. S. Cameron, 22d street and 2d avenue.

THE WAY INVENTORS, MANUFACTURERS AND CONSUMERS ARE MUTUALLY BENEFITED.

It is not the inventor alone who is benefited by the introduction of new and useful machines, but the manufacturer who employs and the communities who enjoy the fruits of ingenuity. It would be a task to enumerate the vast number of articles in daily use which have not only lightened the labor of men but changed the entire social system; we shall not attempt it, but merely call the attention of those directly interested to some significant transactions which have lately been made public through the columns of the SCIENTIFIC AMERICAN. We allude to the incentives held out to ingenious men to accomplish certain tasks under the spur of pecuniary advantage. Messrs. Phelan & Collender, billiard-table manufacturers of this city, offer the sum of $10,000 as a reward for the discovery of a substitute for ivory to be used as a material for billiard-balls [see pages 135 and 166]; and a gentleman in New Hampshire, who modestly conceals himself under the style and title of "the editor of the *National Eagle*," offers a handsome reward for the discovery of a steel horse-shoe which can be taken off and put on readily without nails [see pages 88 and 166]. We have no doubt but that both parties will obtain the objects of their desires; if we may judge by the quantity of models and drawings of horse-shoes which have recently appeared at this office, one of them must already be in as great a quandary which to select as Paris was on Mount Ida, when called on to bestow the golden apple on the fairest of three goddesses, all of whom were equally beautiful.

The course alluded to is undoubtedly most wise. In no other way could such results be obtained. Manufacturers who are now delayed in their operations by reason of imperfect machines, methods or costly materials, should set forth their wants to the inventing world, and they will be satisfied. It is a positive and a palpable advantage. What manner of manufacturing concern or incorporated body is there in existence who would refuse to purchase a process if they knew by so doing they could outstrip all competition by employing it? Not one.

Too many people regard invention as a ticket in a lottery. To inventors of perpetual motions and balloons to go to the moon in five days it unquestionably is; but the sober, sensible, practical men of business know the advantages of using patented improvements, and show their sagacity by stimulating inventors to bring forth machines for special purposes. Let the great business world make known its wants; the choice rests with itself. If it approves of the machines offered to it, make the best bargain possible with the inventor and obtain them. If the designs provided for will not answer, refuse them; no compulsion exists, and the reward can be withheld until the object is attained.

INDIA-RUBBER ONCE MORE.

We have before us the petition of Charles Goodyear, Jr., for the second extension of Letters Patent granted to his father, Charles Goodyear, deceased, for the invention of vulcanized india-rubber. It sets out with a brief account of the early struggles and efforts of Mr. Goodyear to discover and perfect his india-rubber inventions, and depicts, with considerable pathos, the sufferings of himself and family before he realized the ideal which engaged his attention. His family were very destitute of food and fuel—they had no money to buy their bread from one day to another—they did not know what they should do for food—they dug their potatoes before they were half grown, for the sake of having something to eat —Charles, the petitioner for the second extension, when only eight years old, was thankful that they had potatoes—some one sent them a barrel of flour unexpectedly—a child only three years old died, and the family walked to the grave; the remains were carried in a wagon, as the parents could not afford to hire carriages—and, somehow, in spite of all the kindness of neighbors, Goodyear was thrust into a debtor's prison. He began his investigations in the years 1831 and 1832, but did not obtain patents until 1844. Litigation sprung up, and thousands of dollars were expended in the defence of his rights; his

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liabilities at the time of his death amounted to $191,100 73, but what his assets were is not so definitely stated. It also appears that, after the patent had been extended, the net result of the collection of tariffs averaged less than $30,000 per annum—equal to $210,000 for the extended term. We have not all the figures of the receipts and expenditures of Mr. Goodyear under his patents; and we are willing to concede hardships and sufferings on the part of himself and family. We desire not to reflect upon any business management of the dead or to wound the feelings of the living; but it must be apparent to the most casual observer that out of the gigantic operations which have sprung up and are now being carried on, under protection of these valuable patents, somebody has made vast amounts of money. Admitting the poverty of the Goodyear family, we cannot shut our eyes to the dangerous tendency of legislating for private interests, when the result will be to enrich wealthy capitalists by extracting tariffs for their benefit from the pockets of the people.

The petition to Congress is supported by the combined interests of the various manufacturers of india-rubber goods. The extension bill before Congress provides that all persons or corporations, who now hold licenses under the patent, shall, if they continue to make such india-rubber goods, pay to the executor not to exceed five per cent of the net amount of sales of goods or articles manufactured under such licenses. Here we have the whole thing in a nut-shell. All the various manufacturing establishments which hold licenses from the executor of Charles Goodyear are to be allowed to maintain the monopoly for another term of seven years on and after June 15, 1865, and are to pay five per cent of their sales to said executors. No other parties are to be allowed to enter the combination. Under such protection these manufacturers can adjust their own tariff of prices, "none daring to molest them or make them afraid;" and with such exclusive power they can go on and do just about as they please, and the public can have no possible remedy. If rubber shoes, coats and other necessary articles don't pay *satisfactorily* at the present prices, those exclusive manufacturers can add on five, ten, fifteen or fifty per cent, as suits their interests; and the consumers must quietly submit, being privileged only to "growl" at high prices. To confer power by special legislation, whereby a few wealthy capitalists are enabled to tax the resources of the whole country, is unjust and entirely opposed to the spirit of our institutions. If Charles Goodyear's heirs had gone before Congress, and petitioned for the extension of the patents in question on their merits and without reference to the present licensees, every one of the latter would have combined against the heirs. They would have shaken the foundation-stones of the Capitol, and the iron image of Justice which crowns that noble building would have been invoked to descend and lay its metallic hand upon the petitioners and all who favored their pretentions; but so long as the licensees are to gather the lion's share of the revenues, the petition bears to them a very different aspect.

We have no wish or purpose to injure any one of these profitable manufacturing establishments—we rejoice in their abundant prosperity; but it appears to us that they are "laying it on rather thick" when they appear before Congress for an act of special legislation which confers upon them such enlarged and dangerous powers of levying taxation upon an indulgent people. We have no wish to injure the interests of the petitioner—we would cheerfully accord to him a just reward for his father's beneficial labors and for the early trials which his family endured in consequence of his poverty; but "five per cent net," over and above manufacturers' profits, on all sales, for seven years after 1865, would, we submit, be a much greater compensation than they ought to receive. They may well covet so rich a treasure; but the people have a right to protest against such an onerous system of double taxation.

If Charles Goodyear, Jr., will present a claim to Congress for a *fixed* compensation, and can support it by the proper vouchers, we doubt not that the public generally would feel willing that Congress should pay to the heirs a reasonable reward. This plan, we feel well assured, will not suit any of the parties in interest; but it is the only one that merits or should receive any favor. The Government could well afford to make such an appropriation; it consumes very largely of india-rubber goods, and it would be much the best plan of the two, to reject the petition and make an appropriation. The Government must pay 5 per cent to the heirs, under the extension, upon all its rubber purchases in addition to a large manufacturers' profit; therefore, in a mere pecuniary sense, it would be much better to reward the heirs by giving them a fixed amount. We commend this subject to the attention of Congress.

LUBRICATING THE STEAM-ENGINE.

So much waste is continually going on in the very costly item of oil that we are prone to think the cause of it is ignorance and not wholly carelessness, for the most reckless person would hardly be guilty of such criminal waste as is too often manifested. In the matter of supplying the furnaces of a boiler with coal there seems to be little hope of radical reform, for the quantity of half-burned fuel, clinker, and needless waste we have seen thrown out with ashes is astonishing. This neglect shall not claim our attention at present; and in this article reference is made only to the use of oil and lubricants generally.

Oil is not a motive power, and possesses no impulsive energy whatever; but to judge from the manner in which it is slopped about, one would suppose that it had some peculiar virtue hitherto undiscovered. Moreover, the amount of oil which a bearing will carry is limited, and after the surface of it and the brass is once covered, every drop poured on is wasted, for the journal throws it off, just as the stomach does food when overloaded. The proper quantity for any given bearing can be learned only by experience, and engineers will find that they can economize very greatly by a little observation and practice. In addition to this test there are automatic or self-regulating devices for limiting the supply of oil to bearings, these consist of oil-cups, but the use of them if not abused is greatly misunderstood. An oil-cup is not simply a funnel to pour oil into so that it will run down on a bearing, but it is intended for a feeder, or to gage the quantity supplied as exactly as a cock admits water to a boiler. This function is performed by one of the most simple arrangements it is possible to conceive of—namely, a length of cotton wick and a tube. The tube is always fitted in every properly made oil-cup, and the wick only remains to be supplied by the engineer. No engine should be without a cup on every bearing, for it is impossible to judge as accurately what the journal requires as the wick will feed when once properly adjusted. The tube in the oil-cup must not be filled too tight with the wick or it will not feed, and by regulating the size and fit of the wick the oil may be fed fast or slow. Besides the wick there are many other self-feeding oil-cups working on scientific principles which perform very well, and we have merely alluded to the simplest one—that with a wick, as an example of a self-feeding arrangement.

It is not alone the exterior working parts that require lubrication; but the valves and piston should occasionally receive attention as well as the others. We are well aware what a disputed point this is in engineering practice, and can ourselves bear witness to very many steam engines that have been running for years without a drop of oil in their cylinders or valve-chests, but it must be borne in mind that these are exceptional cases, and may be due to the state of the steam, the construction of the engine, and nature of the metals in contact. By the state of the steam is meant whether it is high-dried or super-heated from the construction of the boiler, or whether it is moist, as occurs in boilers with small steam room. Therefore, because one engine here and there runs without oil in the parts mentioned, it does not follow, as a rule, that no valve-seat or piston requires to be lubricated. The medicine which is harmless if taken by one man becomes deadly poison to another, and where in one instance oil would not only be wasted but would injure the machine if applied, in the other it is absolutely essential to economy.

The frequency with which oil is to be introduced into the cylinder is a very important point, for the same rule applies here as to the bearing. All that is not essential to the work is thrown away by the engine or carried out with the exhaust. In proof of this the tubes of some surface condensers were recently discovered to be half choked up with tallow; if this fact were not substantiated by the assertion of a competent engineer we should be inclined to doubt it.

Without further digression, it is important to observe that it is not only the waste of grease which occurs by its lavish use, but the injury which those vital parts—the cylinder, valve-face, and packing—sustain that render the employment of tallow a source of damage to the parts mentioned. It is well-known to experienced engineers that there is a peculiar appearance of packing rings and the piston faces where they set, when much tallow has been used. This peculiar appearance may be called "worm-eaten," since it resembles nothing more than it does the track of an insect; it is to the endurance of the metal just what the ravages of the worm is to timber; in a short time it is wholly destroyed. Some pistons that we have seen might have been cut with a knife. This damage is wholly owing to the free use of grease, and is explained by these facts.

In the rendering of rough fats, such as are used for greasing cylinders and pistons, sulphuric acid is freely used. The quantity of the acid used amounts to, at the least, 12 per centum of the weight of fat, and it combines at once with the whole of the fatty matter; a portion of the acid is removed by washing the grease in water at a high temperature; but a certain part remains behind and becomes a constituent of the rendered mass. This acid is set free when introduced to the steam-cylinder by the heat therein, and though necessarily small in quantity to the proportion of grease introduced at once, exerts its evil influence, and slowly but surely destroys the metal; the iron is eaten up, and the carbon alone remains. Where this adulterated or impure grease has been used too lavishly the iron is entirely destroyed, and what remains may be literally cut with a knife like charcoal. Animal fats are themselves acids, chemically speaking; but these are not specially injurious to iron. The best way to avoid this trouble is to use pure grease or beef tallow, rendered by heat alone. A quantity of this placed in a tin pot on the steam chest will gradually resolve into a pure fat, and by pressing the scraps but little or no waste takes place.

The practice of going about with a squirt can and spirting oil *at* the bearings—not into them—is a most reprehensible one; and no conscientious man in charge of machinery would do it. Oil at $1·50 a gallon is too dear to be used in this way, to say nothing of the moral nature of the act. Cups that feed themselves require to be watched to see that they do not stop feeding; and, in fact, every department of the engineer's duty requires vigilance, so that the wonderful machine may be kept up to its duty. Too many men regard their positions as sinecures—as so many opportunities to read newspapers, to smoke cigars, or to gossip with idle acquaintance. There is but little time when these matters can be indulged without pecuniary loss to the employer or endangering some part of the machinery; and the best course is for the engineer to give his employer all the time he is paid for, and let "outside issues" rest until work is over.

The profession wants elevating; there are more openings at this moment than there are good men to fill them. A capable engineer is always in request; and if any go about idle, let them ask themselves if it is not because they have not studied their interest by using diligence in the discharge of their duty.

Applications for the Extension of Patents.

The patent-extension lobby is in full blast at Washington. Applications are now pending before Congress for the extension of the Goodyear india-rubber patents, Woodworth planing machine, Adam's Janus-faced lock, Fitzgerald's safe; and we presume there are others. We are informed that the parties who support these claims have formed a sort of combination of interests, and mean to "push their cases through," if money will do it. We warn the people to look sharp after these corrupt schemes, and to use their best efforts to defeat them.

A NUMBER of Western capitalists are making arrangements to go extensively and legitimately into the cotton business—both by cultivating abandoned plantations in Louisiana and Mississippi, and by purchasing of the old planters. They mean to demonstrate on a large scale the advantages of free labor.

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RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:—

Burglar-proof Lock.—This invention relates to an improved lock of that class which are provided with tumblers operated through the medium of a key and the bolt moved by a separate or distinct application of power. The object of the invention is to simplify the construction and arrangement of this class of locks, so that it will not be necessary to employ both hands simultaneously in unlocking and locking the lock, and the lock rendered incapable of being picked by tampering with the tumblers while in a locked or unlocked state. To this end the invention consists in having the tumblers connected with a swinging plate which is operated by the arbor that shoots the bolt, and having each tumbler, at one end, provided with a pendant rod which passes into the key-slot or hole; the above parts being used in connection with a tumbler stop, and all arranged in such a manner that the key may first be inserted in the lock and the pendants of the tumblers pressed upon by the movement of the swinging plate under the action of the bolt knob, so that the tumblers may be adjusted in proper position to admit of the moving of the bolt by the time the knob-arbor comes in contact with it. The knob-arbor, by this arrangement, is made to perform the double function of adjusting the tumblers and shooting or operating the bolt, and the desired result is attained. Caspar Jagy and Frederick Denzler, of New York city, are the inventors of this lock.

Sewing Machine.—The first part of this invention relates to the employment, for operating the needle, of a rocker which produces what is called the "loop motion," to commence the formation of the loop and to obtain time for the passage of the shuttie or looper into or through it, by the point of connection of the needle bar passing a little beyond a position directly below the axis of oscillation of the rocker; and it consists in a certain arrangement of the said rocker and of its connections with the needle and with a crank or its equivalent on the main shaft or other rotating shaft of the machine, whereby the central stud or bearing of the rocker is relieved of strain at the time of the entrance of the needle into the cloth. The second part of the invention relates to the employment of the needle to produce the feed movement of the cloth; and it consists in a certain mode of applying and operating the needle bar, whereby the needle is caused to produce the feed in a more effective manner than in the needle-feeds heretofore employed. The third part of the invention relates to the take-up or apparatus for controlling the slack of the needle-thread, and it consists in a certain mode of applying and operating such take-up whereby it is rendered entirely independent of all parts of the needle-operating mechanism. Charles Scofield and A. J. Simmons, of Utica, N. Y., are the inventors of this improvement.

SPECIAL NOTICES.

WM. UPFIELD, of Lancaster, Ohio, has petitioned for a patent granted to him June 25, 1850, for an improved boot-tree.

It is ordered that the said petition be heard at the Patent Office, Washington, on Monday, June 6, 1864.

WILLIAM E. WARD, of Portchester, N. Y., has petitioned for a patent granted to him July 30, 1850, for an improved bolt and rivet machine.

It is ordered that the said petition be heard at the Patent Office, Washington, on Monday, July 11, 1864.

All persons interested are required to appear and show cause why said petitions should not be granted. Persons opposing the extension are required to file their testimony in writing, at least twenty days before the day of hearing.

The Way to introduce the Metrical System.

The Congressional committee on a reform in weights and measures will hardly need the suggestion from us, that the proper mode of introducing the French system will be for Congress to pass a law making *that* the legal system at the end of five or ten years; so as to give the several States an opportunity to have it thoroughly taught in the public schools.

ISSUED FROM THE UNITED STATES PATENT-OFFICE

FOR THE WEEK ENDING MARCH 1, 1864.

Reported Officially for the Scientific American.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

41,749.—Truss Pad.—Solomon Andrews, Perth Amboy, N. J.:

I claim a hollow truss pad constructed as hereinbefore described, having one or more openings for the purpose of introducing the filling material, as set forth.

41,750.—Mode of preparing Albumenized Paper.—Henry F. Anthony, New York City:

I claim combining or mixing the nitrate of ammonia directly with the albumenizing fluid, in the manner and for the purpose substantially as set forth.

41,751.—Lamp.—Lewis J. Atwood, Waterbury, Conn.:

I claim, first, A straight or nearly straight connection extending from the moving part of the ring or hinge to the ratchet cap, when said connection is fitted so as to swing at its end, in opening or closing, and form a diagonal brace to the chimney when turned back, as and for the purposes specified.

Second, I claim connecting the straight swinging rod to the chimney-holder by the head and elongated opening for the rod as specified, whereby the rod is allowed to turn as the chimney-holder is moved on its hinge, as set forth.

41,752.—Wool Press.—J. C. Ball, Ionia county, Mich.:

I claim the end boards, h, in combination with the braces, m, the door or cap piece, N, the clamps, r, the platform, D, the post, C, the lever, P, the leaves, I, and the braces, b, the whole constructed as and for the purpose substantially as herein set forth.

41,753.—Automatic Cistern Regulator.—Abel Beach, Iowa City, Iowa:

I claim, first, The combination and arrangement of a float and valve with a conduit of water and a cistern, all substantially as shown and described.

Second, In combination therewith, the arrangement, A, for adjusting the length of the valve rod.

41,754.—Anchor.—Alexander Bradford, Raynham, Mass.:

I claim, first, The shank, A, having a head, B, forged upon it,

Second, The two sets of flukes, C C, fastened to the shank by rivets, and supported by the braces, D D, substantially as herein shown, and—

Third, The palms, F F, substantially of the same shape as here shown, for the double purpose, of entering the ground easily and of not fouling the cable, as above set forth.

41,755.—Curry-comb.—Charles B. Bristol, New Haven, Conn.:

I claim as a new article of manufacture, a curry-comb made wholly of longitudinal sections, or stripes, when the sections are formed, and riveted together, substantially as herein described.

41,756.—Safety Valve Attachment.—William Camerer, Reading, Pa.:

I claim a pressure equalizing spring, A, acting on the safety valve lever, D, in the manner and for the purpose substantially as set forth.

41,757.—Raisin-stoner.—Rosanna Carpenter, Portsmouth, N. H.:

I claim the arrangement of sets of levers to operate together in the manner and for the purpose substantially as set forth.

41,758.—Valve for Steam Engines.—Francis W. Clough, Springfield, Mass.:

I claim, first, The rotating valve, D, when applied to and used in combination with the head, E, of a steam cylinder, when said head is provided with ports for receiving steam to and exhausting it from the cylinder, substantially as herein set forth.

Second, I claim the pipes, h h, in combination with the valve, D, having the compartments, g g' g'' g''', when arranged and operating, substantially in the manner and for the purpose described.

Third, The steam chest, B, and valve, C, in combination with the ports, H H', and exhaust port, a, when applied to a steam cylinder, substantially in the manner and for the purpose herein set forth.

41,759.—Wringing-machine.—Matthew John Cluff, Waltham, Mass.:

I claim the method of securing a clothes-wringing machine to tubs of varying sizes and shapes by the use in combination with two stationary legs, of swivel brackets swinging on said legs and provided with set screws or other adjusting devices, substantially in the manner and for the purposes described.

I also claim constructing the frame of a clothes wringing-machine with slots to hold the adjusting springs of the rollers of the machine, substantially in the manner and for the purposes described.

I also claim constructing the frame of a wringing-machine with slots to hold the adjusting springs of the rollers in combination with the extension of the vertical sides thereof, forming pins or legs for the swivel brackets as shown and described, the whole being arranged to operate in the manner and for the purposes set forth.

41,760.—Gate.—Reuben R. Cool, Millen's Bay, N. Y.:

I claim the combination of the swinging gate, A, segment, B, cords or chains, D D', post, F, and sliding catch, I, all arranged to operate, substantially as and for the purposes specified.

[This invention relates to an improved means for opening and closing gates without alighting from a horse or getting out of a vehicle. The invention consists in having the inner post of the gate, on which the latter swings, placed in an inclined position so that its upper journal will project over its lower one and towards the outer, and free or disengaged end of the gate, and having the upper journal of said post fitted in a pivoted segment with cords or chains attached, and all arranged in such a manner that by pulling said cords or chains the segment will be moved or turned, and the gate post previously alluded to, thrown out of a vertical position, so as to cause the gate to open and close by its own gravity.]

41,761.—Vegetable-cutter.—Christian Degel, New York City:

I claim an ordinary table provided with a flap, d, in combination with the receptacle beneath such flap, and with the horizontal cutter wheel, o, provided with the adjustable cutters, r, and rotated by the crank, h, for the purposes and as specified.

41,762.—Steam Boiler.—Edward N. Dickerson, New York City:

I claim, first, The combination, in a boiler, of tubes through which the water passes, and which are acted on by the heated gases, with other tubes, through which the same gases pass, and around which the steam circulates and is superheated, substantially as described.

Second, The arrangement of the water tubes, of a tubular boiler, so that by removing doors or plates both ends of the tubes may be reached and cleaned without going into the boiler.

41,763.—Apparatus for amalgamating Gold and Silver.—John S. Diltz, Mount Ophir, Cal.:

I claim the rotary muller together with the copper pan, as applied to this boiling process.

41,764.—Pump.—James K. Fairbank, Waupun, Wis.:

I claim a pump having an interior cylinder adjusted in the manner set forth, and also the bands, B B, and bolts, f f, arranged to strengthen the upper part of the stock and afford bearings for the handle, all as shown and described.

41,765.—Carriage.—Edward France, Cobleskill, N. Y.:

I claim, first, In combination with two bolts operating in unison as described the herein described spring mechanism for the automatic locking or unlocking of the shafts, as set forth.

Second, The combination of two bolts coupled as before referred to, and spring mechanism arranged to operate as described with a ratchet and pawl for locking the bolts, substantially as herein set forth.

Third, Combining with the bolts and spring a pawl and ratchet so arranged or located as that it may be readily actuated to release the spring ratchet and effect the unlocking of the shafts, substantially as herein set forth.

Fourth, The method of locking the wheel plate or fifth wheel by operating the spring ratchet for the purpose of steadying the course of the vehicle, substantially as herein set forth.

41,766.—Muff.—John W. Gay, Brooklyn, N. Y.:

I claim a muff formed with a band or ring of fur at each end of the opening through the muff, as and for the purposes specified.

41,767.—Car Coupling.—Henry C. Glasgow, Chicago, Ill. Ante-dated Feb. 17, 1864:

I claim, first, The construction, combination, and arrangement of the castings, A A', blocks, B B', and partitions, b, with the sliding planks, E F, rods, H I, and springs, s s, as and for the purposes herein shown and described.

Second, In combination with the foregoing, I claim the pin, c, with the stop or rest, c', and bent rod, e, and the slide, g, moving in a longitudinal slot, a, and the recess for the pin, b', arranged as and for the purposes specified.

41,768.—Wrench.—George W. Griswold, Abington, Pa.:

I claim in combination with the shank of the stationary jaw, and with the movable jaw of a wrench, the incline, e, and loose roller, h, for holding the movable jaw from slipping back, whilst it is always free to be moved forward, said roller being held up in place by a spring, substantially in the manner and for the purpose described.

41,769.—Cultivator.—Jacob Haege, Shiloh, Ill.:

I claim the plow beams, I I, fitted in the stays, K, and upon the rods, J, in combination with the springs, L', and curved plates, M, all arranged as and for the purpose specified.

[This invention consists in a novel arrangement of means for raising and lowering the plows, and also for moving or adjusting them laterally; all the parts being arranged in such a manner that the driver while on his seat will have complete control over the implement, and the latter rendered capable of plowing a row of corn at both sides at one operation, or by passing but once along or over the row.]

41,770.—Steam Boiler Furnaces.—John T. Hancock, Boston, Mass.:

I claim supplying commingled air and steam to ignited fuel in furnaces, &c., when the said air and steam are mixed in a separate vessel and introduced into a closed ash-pit below the fire chamber.

41,771.—Dust-pan.—Thomas George Harold, Brooklyn, N. Y.:

I claim, first, Corrugating the bottom of the dust-pan parallel or nearly so with the edge or lip, for the purposes specified.

Second, I claim constructing the sweeping lip of a dust-pan in a triangular form, sectionally for stiffening the same, as specified.

Third, I claim the inclined sweeping lip of a dust-pan, in combination with the corrugated bottom, substantially as specified.

41,772.—Guard for Paint Brushes.—E. C. Haserick, Lake Village, N. H.:

I claim the employment of the elastic looped band, B, in combination with the guard, D, and brush, A, in the manner and for the purpose herein shown and described.

[This invention consists in attaching to the paint brush a rod or bar of metal, wood, bone, or other suitable material, extending down by the side of the brush, so that in using the latter the former will rest upon the article being painted, and serve as a guard or guide, preventing the brush from slipping or sliding, and enabling the painter to paint window-sashes without daubing the glass, and also to stripe articles with straight stripes, and with far greater facility than usual.]

41,773.—Bathing Apparatus.—William Hensler, Milwaukee, Wis.:

I claim the cloth partition, I, fitted within the closet, A, as shown in connection with the pan, H, and chair, G, or any equivalent seat, for the purpose specified.

[This invention relates to a new and improved bathing apparatus, designed more particularly for invalids.]

41,774.—Lamp Burner.—E. Hobbis, Newark, N. J., and Alex. McNair, Bloomfield, N. J.:

I claim a tube placed at or attached to the exterior of the lamp burner, in connection with a horizontal rotating or slide stopper or cover applied to the tube, all arranged substantially in the manner as and for the purpose herein set forth.

[This invention consists in applying a tube to a lamp-burner at the outer side thereof, and having the upper end of said tube provided with a cap or cover, all arranged in such a manner that the lamp may be supplied with oil without unscrewing the burner from the lamp, or moving or disturbing any of the parts thereof, the cap or cover at the same time admitting of the top of the tube being very readily exposed to receive the nozzle of a lamp-filler, and also easily closed when the lamp is filled.]

41,775.—Drop Hammer.—Bennet Hotchkiss, New Haven, Conn.:

I claim, first, The friction clutch described in combination with the hammer of drop presses, when the same is constructed and operates, in the manner and for the purpose substantially as herein set forth.

Second, The lever, L, and spindle, d, where the same are combined with the friction clutch described, for the purpose specified.

Third, The combination of the rod, P, and latch, O, with the lever, L, in the manner and for the purpose substantially as described.

Fourth, The levers, 6 and 7, when combined with the hammer of drop presses, in the manner and for the purpose specified.

Fifth, The lever, 5, and latch, 16, when combined with the hammer of drop presses, substantially as described.

Sixth, The latch, 11, in combination with the rod, P, and the hammer of drop presses, substantially in the manner described.

41,776.—Transferrable Embroidery Pattern.—Charles Henry Hudson, Aske Terrace, Kingdom of Great Britain:

I claim, as an improved article of manufacture, a paper or fabric which has its surface provided with a transferrable embroidery pattern, as herein described.

[This invention consists in the employment or use of a pattern, printed or otherwise, produced upon paper or other suitable material, by means of ink composed of about equal parts of sugar and gum arabic mixed with any color, for the purpose of printing or transferring working patterns upon cotton, woolen, and other fabrics, in such a manner that from one pattern several working patterns can be obtained on any desired fabric for embroidery, braiding, stitching, and so forth.]

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41,777.—Marine Leak Signal.—William Huston, Wilmington, Del.:

I claim the receiver, A, the air tubes, B, the whistle, c, constructed with the hole, d, the whole arranged in the manner and for the purpose herein set forth.

41,778.—Tobacco Pipe.—Clark S. Hutchinson, Burlington, N. J.:

I claim, first, The sponge, G, or its equivalent, adapted to the case, A, and arranged in respect to the opening, x, and the bowl, C, or its equivalent, substantially as and for the purpose set forth.

Second, The combination of the sponge, G, with the rod, f, and plates, e, as set forth for the purpose specified.

41,779.—Hoisting Machine.—Samuel M. Longley, Hudson City, N. Y.:

I claim the employment of the double chain wheel, c d, with a clamp, B, in combination with a system of gearing, C D, and a suitable power wheel, E, substantially as and for the purposes described.

41,780.—Converting Motion.—T. A. Macaulay, New York City:

I claim the combination with each other and with the rotating plate, D, of the three arms, E F G, wrist, H, and pitman, I, as herein shown and described.

41,781.—Apparatus for rendering Lard, &c.—Sylvester March, Chicago, Ill.:

I claim, first, The employment in the art of rendering lard, tallow, or other fatty matter, of an elongated semi-cylindrical vessel or vessels of other form substantially the same, so that large quantities of matter may be operated upon with ease, while the heat emitted by the burning of the fuel is more perfectly utilized than heretofore.

Second, The employment in the art of rendering lard, tallow, or other fatty matter of an elongated heating vessel having at one end a drain pipe provided with faucets or cocks to cut off the flow of liquified mass at pleasure.

Third, The employment in combination with an elongated vessel for rendering lard, tallow, or other fatty matter provided with a drain pipe and faucet of a strainer within the boiler arranged in any convenient manner.

41,782.—Extracting Tan Bark.—S. W. Pingree, Lawrence, Mass.:

I claim the within-described process of extracting tan bark by first swelling the bark with water or weak tan liquor, and heating it with steam, and afterwards steeping with cold water or weak tan liquor, substantially in the manner set forth.

And I also claim introducing steam into the bark contained in a leach-tub at different points through a flexible pipe, D, with a metallic mouth piece, E, in the manner and for the purpose substantially as specified.

[This invention consists in treating tan bark after it has been ground first with weak tan liquor or water, whereby the bark is swelled and its strength partially extracted, and exposing the same, after the first liquor has been drained off, to the action of steam, which penetrates the swelled bark and prepares it for a second percolation with cold water or weak tan liquor, in such a manner that by the application of the first lotion the bark is prepared for the action of the steam, and by the application of the steam the bark is heated and brought in the best possible condition to give up its tannin to the second lotion of cold water or weak tan liquor.]

41,783.—Stop Gauge for Weather-boarding.—William F. Redding, Troy, N. Y.:

I claim the use of the slotted bar, A, provided with an adjustable blade, C, in combination with the slide, D, and set screw, c, as and for the purpose set forth.

[This invention consists in the application of an adjustable knife or spur to the top end of the bar which forms the guide for the slide in such a manner that said spur can be made to project more or less beyond the front edge or face of the bar, and when its point breaks it can readily be taken off, sharpened, and replaced, thus avoiding the necessity of throwing away the entire blade when the point breaks. The invention consists also in the employment of a slotted bar to form the gulde for the grooved slide in such a manner that when, by some accident, the screw which is intended to hold the slide in its place works loose while the gauge is in use on a building, said slideis prevented from dropping down to the ground, and the workman is enabled to put it back to its place and refasten it without the necessity of leaving his work and going all the way down to the ground to pick it up, and furthermore the gauge becomes much lighter and cheaper in the manufacture.]

41,784.—Hand Planter.—Francis H. Roberts, Wilmington, Ind. Ante-dated Feb. 21, 1864:

I claim combining with the seeding devices the adjustable elastic stops, M M', substantially as described.

41,758.—Lubricator.—Robert Ross, Bethlehem, Penn.:

I claim, first, A reservoir, A, hollow screw spindle, D, rod, H, and any suitable spring for raising said rod, and the valve herein described, the whole being constructed and arranged substantially as set forth, for admitting oil to, and discharging it from, the reservoir by the simple turning of the said spindle, D.

Second, The cup, G, with its oil receptacle, z, air-chamber, y, and tube, f, constructed and applied to the hollow spindle, D, substantially as and for the purpose herein set forth.

Third, The combination of the hollow block, C, spring, M, and grooves, i, at the bottom of the rod, H.

41,786.—Molds for casting Bungs, Plugs, &c.—Archibald H. Rowand, Allegheny, Pa.:

I claim a mold constructed substantially as and for the purposes set forth.

41,787.—Mode of strengthening and improving Sheet-iron Buildings.—Samuel J. Seely, Brooklyn, N. Y.:

I claim the process herein described of strengthening and otherwise improving the walls (or floors) of sheet metal buildings.

41,788.—Regenerator Furnace.—Charles Wm. & Frederick Siemens, London, Great Britain:

We claim in combination with a furnace, A, and its chimney or smoke discharge flue, P, a system or series of air and gas regenerators, B1 B2 B3 B4, constructed substantially as specified, and having conduits and dampers arranged so that air and gas may be led into and through such regenerators and furnace and out of the chimney in manner, and so as to be operated as and for the purpose or purposes hereinbefore described.

We also claim the arrangement and combination of the air space or open chamber, C, with the furnace and its system of regenerators arranged and applied together, substantially in manner and so as to operate as described.

We also claim the arrangement and combination of the air chamber or space, D, or the same and the space, E, with the furnace, regenerators, conduits, and damper chests applied thereto, the whole being substantially as specified.

41,789.—Machine for drilling and boring Metal.—Coleman Sellers, Philadelphia, Pa.:

I claim the use of that combination of gearing in which a wheel or wheels may either be made to transmit motion as idlers or by their rotation around a fixed or a moving wheel be themselves the means of modifying velocity, substanially as and for the objects specified.

41,790.—Sewing Machine.—A. G. Simmons & Charles Scofield, Utica, N. Y.:

We claim, first, The arrangement of the rocker, I, and its connections, J K, with the crank wrist and needle bar substantially as herein described, whereby at the time of the needle entering and passing into the cloth or other material to be sewed the said connections are brought parallel, or nearly so, with each other, and the stud or center bearing of the rocker is relieved of pressure and strain, substantially as herein specified.

Second, The arrangement of the needle bar to slide in an oscillating sheath, L, operated by a cam, H, rock shaft, M, arms, e g, and spring, d, or their equivalents, substantially as and for the purpose herein specified.

Third, The take-up, N, to draw the thread through the eye, n, attached to a rock shaft, P, and operated independently of the needle-operating mechanism by means of a cam, G, and spring, t, substantially as and for the purpose herein specified.

41,791.—Hair Restorer.—Charles Smith, Buffalo, N. Y.:

I claim a composition for the hair compounded of the ingredients, substantially as herein described.

41,792.—Lamp Chimney.—William Starkey, Bridgeport, N. J.:

I claim the metal cap composed of the outer casing, C, and inner casing, D, adapted to each other, and arranged in respect to the glass portion, A, of the chimney, substantially as and for the purpose herein set forth.

41,793.—Raking Attachment to Harvester.—Abraham Stoler & Samuel A. Sisson, Bristol, Pa.:

We claim, first, The automatic attachments as described, consisting of plate, H, button, G, arm, F, upright, C, rakes, D and E, guide, K, and bent arm, L, or their equivalents, in combination with the shaft, I, when arranged, substantially as and for the purposes set forth.

Second, We also claim giving the rake shaft, I, its elevating motion by means of button, G, and arm, F, substantially as described.

Third, We also claim the double platform. A and B, in combination with the two rakes, D and E, when so operated that rake, E, passes over and under platform, A, and the rake, D, is kept in an upright position while on its forward stroke, and in a horizontal position while on back stroke.

Fourth, We also claim rake, E, when operated in the manner described, by means of shaft, I, and button, G, or their equivalents, in combination with the double platform.

41,794.—Lamp.—Albert Taplin, Providence, R. I.:

I claim the construction of the connections substantially as herein set forth and for the purpose specified.

41,795.—Lamp Collar.—Albert Taplin, Providence, R. I.:

I claim the combination of the upper and lower parts of the collar with the clasp-joint and spring, D, when constructed and operating substantially as described and for the purpose set forth.

41,796.—Lamp Chimney.—T. J. Townsend, Baltimore, Md.:

I claim the employment or use in a lamp chimney of a metal top, B, so constructed and arranged as to admit of expanding and contracting circumferentially for the purpose of being readily fitted to and detached from the glass portion, A, of the chimney, substantially as set forth.

[This invention relates to a new and useful improvement in that class of draught chimneys for lamps which are provided with a metallic upper portion in order to prevent breakage, a contingency of very frequent occurrence in the use of the entire glass chimneys, in consequence of an unequal expansion of the same under the heat of the flame.]

41,797.—Slitting Gage.—John W. Van Deventer, Dundee, Mich.:

I claim as an improved article of manufacture the slitting gage above described, having an adjustable knife, E, arranged in the center of the handle; a beam socket, a, at its side, a screw, e, for adjusting the knife; and a tapering key, F, passing from the front into the lower part of the handle, and otherwise constructed and operating in the manner herein shown and explained.

[The object of this invention is to obtain a slitting gage of simple construction, which will admit of its knife being adjusted with the greatest facility in order to cut at a greater or less depth as desired, and also admit of having its parts detached so as to render the device portable when not required for use or when stowed away or packed for transportation.]

41,798.—Wardrobe Hook.—Alexander J. Walker, New York City:

I claim the pendant wardrobe hook, constructed substantially as and for the purpose specified.

41,799.—Apparatus for Pumping and Condensing.—George I. Washburn, Worcester, Mass.:

I claim, first, The oscillating chambered shaft, A 1 2 3 4, arms, D1 D2, balls, E1 E2, and ports, W1 W2 W3 S1 S2, constructed, arranged, and operating substantially as and for the purposes set forth.

Second, In combination with the above described oscillating chamber shaft, I claim the elevated condensing tank, I, water-pipe, J, and steam-pipe, H, operating in the manner described to condense steam by contact either with the water in the tank, I, or with the part of the pipe, H, immersed therein.

Third, The combination of the steam-pipe, G G1 G2, oscillating chambered shaft, A 1 2 3 4, and discharge passages, W' K, substantially as and for the purposes set forth.

Fourth, In an apparatus constructed and operating substantially as hereinbefore described, I claim the employment of the current of water forced through the pipe, K, to communicate motion to machinery in any manner substantially as described.

[This invention chiefly consists in an automatic apparatus whereby water may be elevated with economy and rapidity, and which is applicable to the purposes of a steam engine condenser and boiler feeder, or it may be used for elevating water for other purposes in any place where steam is available to work it.]

41,800.—Cut-off Valve for Steam Engines.—James D. Whelpley, Boston, Mass.:

I claim, first, The employment of a slightly movable piston, G, or its equivalent, substantially as set forth and for the purpose described.

Second, Connecting with the valve seat, G, a rod, P, the end of which shall move the depressible section, V, of the valve rod, substantially as described.

Third, The combination of the cover or valve, K, with the movable obstruction, or valve-seat, G, for the purpose of regulating the action of the latter in the chamber, B, substantially as described.

Fourth, In combination with the movable obstruction, G, the piston, J, for the purpose of balancing, or counteracting the variations of steam pressure in the boiler and pipe, substantially as described.

Fifth, The chamber, B, as an expansion or recess of the induction pipe, substantially as and for the purpose described.

41,801.—Machine for hot-pressing Textile Fabrics.—Richard Renner Wilson, Halifax, England:

I claim, first, The combination of the rods or rails, I, the guide rails, J, the links, K, the rods, L, the levers, M, the bar, N, and the lever, O, with the parts of a steam press, substantially as and for the purpose set forth.

Second, I claim the rods or rails, I, the guide rails, J, and the links, K, for suspending the plates.

Third, I claim the rods, L, the levers, M, bar, N, lever, O, and parts in connection for lifting the said plates, substantially as herein set forth and explained by the accompanying drawings.

41,802.—Construction of War Vessels.—Joseph P. Wood bury, Boston, Mass.:

In a vessel constructed with a vulnerable upper deck and sides above an invulnerable lower deck and plated bottom, I claim resting a battery or batteries, immediately on or below said invulnerable deck, substantially as and for the purpose described.

41,803.—Revolving Fire-arm.—S. W. Wood, Cornwall, N. Y.:

I claim the employment of apertures in the periphery of the cylinder (in front of the bottom of its chambers) leading respectively into the same, so as to admit the hammer to strike against the sides of primer cartridges and explode them, substantially as described.

41,804.—Envelope.—Calvin C. Woolworth, New York City:

I claim the use of an envelope of the construction described, with different addresses applied to its respective flaps or sides or both, so that by reversing the positions of the flaps the envelope will be adapted for transmission in alternate directions between certain places, all as hereinbefore explained.

[This invention relates to an envelope having two flaps, on the outer faces of which are imprinted the addresses of two points in mutual communication; so that by merely reversing the positions of the flaps the envelope may be adapted for alternate transmission; the article being designed for the use of post-offices, express companies and mercantile houses.

41,805.—Manufacture of Iron.—Joseph Yates, Mott Haven, N. Y.:

I claim, first, The method hereinbefore described of equalizing the temperature throughout all the chambers of the reducing oven, by increasing the capacity of said chambers in proportion to the intensity of the heat of the flame passing through them, substantially as set forth.

Second, The method hereinbefore described of equalizing the temperature throughout all the chambers of the reducing oven, by proportioning the area of the flues leading to and from the chambers, in accordance with the intensity of the heat of the flame passing through said flue and chamber, substantially as set forth.

Third, The method hereinbefore described of equalizing the temperature throughout all the chambers of the reducing oven by so combining said chambers with flues that the capacity of the former and the area of the latter are proportionate to the intensity of heat of the flame, substantially as set forth

41,806.—Apparatus for the Manufacture of Iron.—Joseph Yates, Mott Haven, N. Y.:

I claim, first, Forming the hollow re-bridge of cast-iron and connecting the same by means of an india-rubber or other hermetic joint located upon the outside of the furnace with tubes or their equivalent for conveying the blast of air too, through and from the fire-bridge, substantially as herein set forth.

Second, I claim the combination of the hollow cast-iron fire-bridge and tubes for conveying the blast to and from the said bridge with intermediate hollow cast-iron side wall pieces so that the sides in contiguity with the bridge shall by a blast of air through them be kept cool and preserved from injury, substantially as herein set forth.

Third, I claim iron casing that portion of a reverberatory furnace which is above the sole, by making the sole of cast-iron plate flanged to clasp the armor-plate, substantially as hereinbefore described.

Fourth, I claim combining with a reverberatory furnace operated by heated blast of air a reducing oven or apparatus so arranged in relation to each other that the flame and heated gases of the former shall be discharged into the latter at the temperature requisite for the reduction of the ore, substantially as herein set forth.

Fifth, I claim forming in a furnace operated by a heated blast a double reverberatory roof, and so combining the same with a reducing oven that the contents of the latter may be discharged directly upon the sole of the furnace under the reverberatory roof, most distant from the fire, substantially as set forth.

41,807.—Furnace and Oven for the Manufacture of Iron.—Joseph Yates, Mott Haven, N. Y.:

I claim, first, A furnace of such construction that heat and gases necessary for the working of the whole apparatus, are generated therein and by a reverberatory arch deflected upon the hearth to weld the particles of iron together; its flue or flues for the exit of the flame being by exposure to the air partially protected from the effects of excessive heat while the end wall at or about the flue affords ready access and is thus capable of repair while the furnace is operation.

Second, An oven in which the ore is reduced by the flame and gases emanating from the furnace, so arranged in relation to the said furnace, that the heat of the latter conveyed by radiation or otherwise, does not reach the oven so as to injuriously affect its structure, also that the flue or flues receiving and conducting the flame and gases to the reducing chambers are protected by external contact with the air from the deteriorating action of excessive heat within.

Third, A stack or chimney connected with the reducing oven to carry off the products of combustion and provided with means for regulating the pressure of the gases within the apparatus.

Fourth, I also claim so constructing a reducing oven upon arched columnar or other openwork foundation as to allow of free circulation of the air underneath as well as around it, and so that the heat radiated or otherwise conveyed from the welding furnace does not injuriously affect it, substantially as set forth.

41,808.—Apparatus for the Manufacture of Iron.—Joseph Yates, Mott Haven, N. Y.:

I claim the employment in combination with a reducing oven having two or more reducing chamber superposed and heated by the flame or gases derived from a welding furnace, of a double or divided chimney so that each chamber shall be provided with its own chimney or division of chimney which may or may not intercommunicate at the pleasure of the operator, substantially as herein set forth.

I also claim locating such double or divided chimney back of and in contiguity with the reducing oven, the openings of communication of the chimney with the oven being arranged in relation to the partition or division walls so as to allow of the expansion of gases previous to their entering the reducing chambers, substantially as herein set forth.

I also claim the arched reducing tables formed of refractory brick of uniform width set edgeways or otherwise, so that the same shall be of uniform thickness throughout, substantially as set forth.

I also claim so locating the divided chimney in relation to the reducing oven as that the flame and heated gases shall be diverted from the working doors, substantially as herein set forth.

I also claim combining with a reducing oven having two laterally arranged series of reducing chambers, a double divided chimney located in contiguity with the oven and between the working doors thereof, substantially as herein set forth.

41,809.—Hoop Skirt.—Horace B. Ames, Brooklyn, N. Y., assignor to Theodore D. Day & Gilbert Horton, New York City:

I claim a non-extension hoop skirt, formed by uniting the ends of the springs by the clasp, c, constructed and applied as specified.

41,810.—Cut-off Valve Gear for Steam Engines.—Wells L. Colborn (assignor to himself and John M. D. Green), Elmira, N. Y.:

I claim regulating the flow of steam to the cylinder by means of the adjusting sliding block, T, connected with the governor, the fulcrum slide, g, rock-lever, G, provided with slot, f, or equivalent, and connected with the eccentric and the crank, E, the whole arranged substantially as described.

41,811.—Grain Drill.—J. W. H. Doubler (assignor to himself and John E. Wynne), Warren, Ill.:

I claim, first, The combination and arrangement of the adjustable circular drills, b, the scrapers, c, arm, B, and lever, C, arranged and operating as and for the purposes delineated and described.

Second, I claim the scrapers, c, arranged in combination with the circular drills, b, and operating as and for the purposes set forth.

Third, I claim the combination and arrangement of the circular drills, b, the scrapers, c, the tubes, e, spiral shaft, F, and roller, R, arranged and operating as and for the purposes herein delineated and described.

41,812.—Apparatus for separating Fibers of Flax, Hemp, &c.—Jim B. Fuller (assignor to himself and James P. Upham). Claremont, N. H.:

I claim, first, The cylinder, c' and slide, d, in combination with the hopper, f, and opening, h, for supplying the vegetable material to the curing vessel, and maintaining the pressure in said vessel, as specified.

Second, I claim the arm, l, and revolving shaft, k, applied to the curing vessel, a, for the purposes and as specified.

Third, I claim regulating the amount of material passing from the curing vessel to the grinder by a pump, applied between said grinder and curing vessel, as specified.

Fourth, I claim the plunger, u, in combination with the pump, n, for the purposes and as specified.

Fifth, I claim the curing vessel, o, applied between the curing vessel, a, and the grinder, q, whereby superheated steam is applied to the material before grinding, for the purposes set forth.

Sixth, I claim the return pipe, s, connecting from the bottom of the grinder to the upper portion of the curing vessel for returning the ground material to the curing vessel for the purposes and as specified.

41,813.—Disintegrating and separating Flax, Hemp, &c.—Jim B. Fuller (assignor to himself and James P. Upham), Claremont, N. H.:

I claim, first, Separating the gummy and silicious substances from vegetable fiber, when softened by heat and moisture, by pressing out such dissolved and watery substances by rollers or other suitable mechanism acting lengthwise of the fiber, substantially as specified.

Second, I claim subjecting the vegetable fiber when in a softened state to the action of rollers, whose surfaces move at different velocities, for the purposes and substantially as specified.

Third, I claim the application to the fibers of flax, hemp, or other substances while being rubbed for their separation of jets of steam of the required temperature, for the purposes and substantially as specified.

41,814.—Breech-loading Fire-arm.—Wm. E. Hicks (assignor to Edward Robinson & E. Chamberlin), New York City:

I claim cutting away the shank, c, at e e, as described, so as to leave the dirt receptacles, f f, in its hole or receiver (in the frame), substantially as set forth.

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41,815.—Preparation of a Phosphate of Lime for Culinary and other Purposes.—E. N. Horsford, Cambridge, Mass., assignor to John H. Cheever, New York City:

I claim this double phosphate of lime of the composition and preparation substantially as above described for the uses above set forth.

41,816.—Current Water Wheel.—Jerome B. Howe (assignor to himself and Josiah C. Richards), Middleville, Mich.:

I claim in the construction of a submerged vertical shaft current water-wheel, the combination of the hinged buckets, d d, and braces, e e, arranged and operating substantially as and for the purposes herein specified.

41,817.—Lock.—Casper Jagy & Frederick Denzler (assignors to Walter K. Marvin), New York City:

We claim the tumbler, I, provided with the pendant, J, in combination with the plate, D, bolt, B, and knob arbor, G, all arranged to operate in the manner substantially as and for the purpose herein set forth.

41,818.—Cutting Tool for Turning.—Asa S. Libby, Manchester, N. H., assignor to Gordon McKay, Boston, Mass.:

I claim the described cutting tool when constructed and made so as to operate substantially as set forth.

41,819.—Apparatus for distilling and rectifying Whiskey and other Spirits.—Elijah Freeman Prentiss, Philadelphia, Pa., and Robert Adam Robertson, Liverpool, England:

We claim, first, The arrangement and combination of the chambers, 1 and 2, whereby the liquid to be distilled is made to act as a cooling medium in chamber 1, and as a regulating medium in chamber 2, substantially in the manner described.

Second, The employment of chamber No. 2, in combination with the regulator or its equivalent for maintaining any constant or desired temperature, substantially as described.

Third, The construction of the shelves in chamber, 4, substantially as described.

Fourth, The employment of one or more perforated cases, U, or its equivalent, in connection with either or both of the chambers, 2 or 3, for deodorizing, purifying, or flavoring the distilled spirit while in the vaporous condition, and before condensation, substantially as described.

Fifth, We claim the employment of chamber, 3, for raising the wash before it is introduced into chamber, 4, to a greater heat than said wash gets in chamber, 2, substantially in the manner described.

41,820.—Card Games.—C. W. Saladee (assignor to Samuel Hart & Isaac Levy), Paducah, Ky.:

I claim a "card register" (for registering the "points" and "games" in games at cards), when constructed and operating substantially as set forth.

41,821.—Water Wheel.—D. S. Stephens (assignor to himself and Charles Seymour), La Porte, Ind.:

I claim, first, The bucket, B, placed longitudinally on the shaft, A, with inclined planes, a, between them, in combination with the curved or spiral buckets, C C, placed at each end of the buckets, B, and the latter encompassed by chutes, E, all being placed within a box or penstock, D, and arranged as and for the purpose specified.

Second, The inclined planes, a a, placed on the shaft, A, between the buckets, B, when used in connection with the buckets, C C, box or penstock, D, and chutes, E, substantially as and for the purpose set forth.

[This invention relates to an improved water-wheel of that class in which the direct and reactive force of the water is obtained, and it consists in the employment or use of a series of buckets which are placed longitudinally on the shaft with inclined planes between them in combination with a series of curved or spiral buckets at each end of the longitudinal buckets, the latter being encompassed by chutes for directing the water properly upon them, and all placed within a box or penstock, whereby it is believed that an economical wheel is obtained and one that will give out a large per-centage of the effective power of the water.]

41,822.—Machine for making Augers.—Mary Tower, (administratrix of the estate of Isaiah Tower, deceased), Rochester, N. Y.:

I claim a series of plates constructed and operating in the manner and for the purpose substantially as herein described and represented.

41,823.—Cement for sealing Preserve Cans.—Joseph B. Wilson (assignor to himself and John B. Moore), Fisherville, N. J.:

I claim a sealing cement composed of the ingredients and in the manner described.

DESIGNS.

1,904.—Jacket for Lamp Burners.—Charles Deavs (assignor to Archer & Pancoast), New York City:

1,905.—Spool-holder for Sewing Machines.—John G. Folsom, Winchendon, Mass.:

1,906.—Macaroni Spoon.—Webb Harding, Cambridge, Mass.:

1,907.—Floor-cloth Pattern.—John Neil (assignor to Wm. M. Brasher & S. H. Herriman), Clinton, Mass.:

1,908.—Floor-cloth Pattern.—Joseph Robley (assignor to Brasher, Herriman & Co.), Brooklyn, N. Y.:

EXTENSION.

Meat-cutting Apparatus.—John G. Perry, South Kingston, R. I. Patented Feb. 26, 1850. Re-issued Feb. 25, 1862:

I claim, first, The use and employment of the studs, s s s, Fig. 3, with one or both of the discharge openings, L L, substantially as described and for the purpose herein set forth.

Second, I claim combining the knives and space blocks with the case of a meat-cutter, in the manner substantially as herein described and for the purposes set forth.

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MESSRS. MUNN & CO.:—I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the office, a marked degree of promptness, skill, and fidelity to the interests of your employers. Yours very truly,

CHAS. MASON.

Judge Mason was succeeded by that eminent patriot and statesman, Hon. Joseph Holt, whose administration of the Patent Office was so distinguished that, upon the death of Gov. Brown, he was appointed to the office of Postmaster-General of the United States. Soon after entering upon his new duties, in March, 1859, he addressed to us the following very gratifying letter:

MESSRS. MUNN & CO.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you discharged your duties as Solicitors of Patents, while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and I doubt not justly deserved) the reputation of energy, marked ability, and uncompromising fidelity in performing your professional engagements.

Very respectfully, your obedient servant,

J. HOLT.

Hon. Wm. D. Bishop, late Member of Congress from Connecticut, succeeded Mr. Holt as Commissioner of Patents. Upon resigning the office he wrote to us as follows:

MESSRS. MUNN & CO.:—It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency; and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully, your obedient servant,

WM. D. BISHOP.

THE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a written reply, corresponding with the facts, is promptly sent, free of charge. Address MUNN & CO., No. 37 Park Row, New York.

As an evidence of the confidence reposed in their Agency by inventors throughout the country, Messrs. MUNN & CO. would state that they have acted as agents for more than TWENTY THOUSAND inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of inventors and patentees, at home and abroad. Thousands of inventors for whom they have taken out patents have addressed to them most flattering testimonials for the services rendered them; and the wealth which has inured to the individuals whose patents were secured through this office, and afterwards illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! Messrs. MUNN & CO. would state that they never had a more efficient corps of Draughtsmen and Specification Writers than those employed at present in their extensive offices, and that they are prepared to attend to patent business of all kinds in the quickest time and on the most liberal terms.

PRELIMINARY EXAMINATIONS AT THE PATENT OFFICE.

The service which Messrs. MUNN & CO. render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there; but is an opinion based upon what knowledge they may acquire of a similar invention from the records in their Home Office. But for a fee of $5, accompanied with a model, or drawing and description, they have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through the Branch Office of Messrs. MUNN & CO., corner of F. and Seventh streets, Washington, by experienced and competent persons. Many thousands of such examinations have been made through this office, and it is a very wise course for every inventor to pursue. Address MUNN & CO., No. 37 Park Row, New York.

HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention if susceptible of one; or, if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the Government fees, by express. The express charge should be pre-paid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by a draft on New York, payable to the order of Messrs. MUNN & CO. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park Row, New York.

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The Patent Laws, enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners, except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms. Foreigners cannot secure their inventions by filing a caveat; to citizens only is this privilege accorded.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The Government fee for a caveat is $10. A pamphlet of advice regarding applications for patents and caveats is furnished gratis, on application by mail. Address MUNN & CO., No. 37 Park Row New York.

EXTENSION OF PATENTS.

Many valuable patents are annually expiring which might readily be extended, and if extended, might prove the source of wealth to their fortunate possessors. Messrs. MUNN & CO. are persuaded that very many patents are suffered to expire without any effort at extension, owing to want of proper information on the part of the patentees, their relatives or assigns, as to the law and the mode of procedure in order to obtain a renewed grant. Some of the most valuable grants now existing are *extended patents*. Patentees, or, if deceased, their heirs, may apply for the extension of patents, but should give ninety days' notice of their intention.

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REJECTED APPLICATIONS.

Messrs. MUNN & CO. are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of their Washington Agency to the Patent Office affords them rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Their success in the prosecution of rejected cases has been very great. The principal portion of their charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted, are invited to correspond with MUNN & CO., on the subject, giving a brief history of the case, inclosing the official letters, &c.

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Messrs. MUNN & CO., are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business they have offices at Nos. 66 Chancery lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. They think they can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through their agency.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through MUNN & CO'S Agency, the requirements of different Government Patent Offices, &c., may be had, gratis, upon application at the principal office, No. 37 Park Row, New York, or any of the branch offices.

SEARCHES OF THE RECORDS.

Having access to all the official records at Washington, pertaining to the sale and transfer of patents, MESSRS. MUNN & CO., are at all times ready to make examinations as to titles, ownership, or assignments of patents. Fees moderate.

INVITATION TO INVENTORS.

Inventors who come to New York should not fail to pay a visit to the extensive offices of MUNN & CO. They will find a large collection of models (several hundred) of various inventions, which will afford them much interest. The whole establishment is one of great interest to inventors, and is undoubtedly the most spacious and best arranged in the world.

MUNN & CO. wish it to be distinctly understood that they do not speculate or traffic in patents, under any circumstances; but they devote their whole time and energies to the interests of their clients.

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MESSRS. MUNN & CO., having access to all the patents granted since the rebuilding of the Patent Office, after the fire of 1836, can furnish the claims of any patent granted since that date, for $1.

THE VALIDITY OF PATENTS.

Persons who are about purchasing patent property, or patentees who are about erecting extensive works for manufacturing under their patents, should have their claims examined carefully by competent attorneys, to see if they are not likely to infringe some existing patent, before making large investments. Written opinions on the validity of patents, after careful examination into the facts, can be had for a reasonable remuneration. The price for such services is always settled upon in advance, after knowing the nature of the invention and being informed of the points on which an opinion is solicited. For further particulars address MUNN & CO., No. 37 Park Row New York.

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The assignment of patents, and agreements between patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park Row, New York.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with patent property or inventions to call at our extensive offices, No. 37 Park Row, New York, where any questions regarding the Rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid) should be addressed to MUNN & CO. No. 37 Park Row, New York

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It is important that all works of reference should be well bound. The SCIENTIFIC AMERICAN being the only publication in the country which records the doings of the United States Patent Office, it is preserved by a large class of its patrons, lawyers and others, for reference. Some complaints have been made that our past mode of binding in cloth is not serviceable.

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would adopt the style of binding used on the old series, *i. e.*, heavy board sides covered with marble paper, and morocco backs and corners.

Believing that the latter style of binding will better please a large portion of our readers, we commenced on the expiration of Volume VII., to bind the sheets sent to us for the purpose in heavy board sides, covered with marble paper and leather backs and corners.

The price of binding in the above style is 75 cents. We shall be unable hereafter to furnish covers to the trade, but will be happy to receive orders for binding at the publication office, No. 37 Park Row, New York.

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Notes and Queries

J. P. K., of the U. S. N.—We are almost daily in receipt of letters from naval engineers, but are pained to notice that yours—out of all the number—is the only one that is intemperate in tone. You fall into the error that a great many others do, and fancy that when you differ in opinion from the editor of a newspaper, it is only necessary to write him an abusive letter to convince him of his ignorance. We shall be pleased to receive criticisms on our articles from you or any one else; but ridicule is not argument, neither does it convince any one, and so far from errors of statement passing unnoticed in this journal, if you would just bear in mind the fact that there are some 30,000 mechanics, more or less, who weekly read the SCIENTIFIC AMERICAN, you would think it st possible that you *might* be wrong and others right. You should not snub us for stating that smoke is combustible, and quote C. Wye Williams to sustain you; it *is* one of the most combustible substances, and even Williams himself makes no such broad assertion as you impute to him; he finds that it is not economical in a pecuniary point of view, although the combustion of smoke itself is eminently practicable.

B. T. L., of R. I.—Indian ink is a mixture of lamp-black and glue, with the addition of camphor and other substances in small quantities. It is said that the attempts to imitate it in this country and Europe have not been entirely successful. Many efforts have been made to obtain a suitable fluid vehicle for the carbon inks. Professor Traill says that an acetic solution of gluten answers the purpose. The gluten should be kept from 24 to 36 hours in water, and then be digested in acetic acid of specific gravity 1.033 to 1.034 in the proportion of 3 parts of gluten to 20 of acid. It is submitted to a gentle heat till a greyish white saponaceous fluid is obtained. Then 8 to 12 grains of the best lamp-black and 2 grains of indigo are incorporated with each fl id ounce of the liquid. Some cloves digested at first with the acid are thought to prevent mildew.

C. F., of Ill.—The profession of civil engineer has furnished to skillful men constant and we believe rem nerative employment. We judge from this that the future will be equally encouraging. We would not, however, have you adopt the profession on this statement, as you might be disappointed with the result. You are better qualified to judge for yourself than others are for you what business you should follow.

E. H., of N. Y.—We cannot inform you where chilled iron has been used on journals under water. It would last longer than common cast-iron if the scale was not broken from the peculiar vitreous or glassy texture of the outside; chilled iron is often spoiled by turning; the chill not striking in much below the surface is removed by the tool and the work rendered usel ss for its peculiar office. Franklinite cannot be worked practically by tools; we have seen a specimen of it drilled into at the Novelty Works, but it must be alloyed before it can be employed to any advantage for turning or planing. Chilled surfaces are to be avoided where tools have to be used, as it is impossible to make a good job on them.

J. A. S., of Ill.—We do not kuow what became of "Paine's Spray Engine," but we imagine it died a natural death. The difficulty of preventing the heaters from burning out rapidly has not yet been overcome practically. The idea has been tried many times.

Money Received.

At the Scientific American Office, on account of Patent Office business, from Wednesday, March 2, 1864, to Wednesday, March 9, 1864 :—

H. W. K., of N. Y., $25; Mrs. S. A. M., of N. Y., $50; A. S. H., of N. Y., $12; A. & S., of N. Y., $20; D. P., of N. Y., $25; E. W. B., of N. Y., $20; W. U., of Ohio, $50; F. B. & D. F. D., of N. Y., $10; A. C., of N. Y., $16; J. T. E., of N. Y., $16; W. B. I., of N Y., $16; L. R., of N. Y., $150; J. H. S., of Ill., $45; D. M., of N. Y., $31; J. B. W., of N. J., $16; P. B., of N. J., $20; A. L., of W. Va., $20; T. S. W., of Ohio, $25; G. B. McD., of Ky., $20; J. McK., of N. Y., $41; W. F., of Mass., $62; W. & V., of N. J., $16; E. S. H., of N. J., $26; S. S., of N. Y., $16; F. J. N., of Mo., $25; J. R. B., of Pa., $16; W. W., of N. Y., $28; W. A., of Wis., $16; D. D. G., of Wis., $25; O. J. B., of Cal., $25; J. S., of N. Y., $25; A. A., of N. Y., $25; F. A. De M., of N. Y., $26; P. B., of N. Y., $41; D. M., of N. Y., $25; W. H., of N. Y., $25; J. B., of N. J., $16; S. & G., of Pa., $45; L. & L , of Mass., $20; F. K., of N. Y., $16; C. A. S., of N. Y., $16; E. C., of Mich., $20; M. T., of Iowa, $20; C. T., of N. J., $20; A. T. T., of N. Y., $16; E. S. H., of N. Y., $20; H. S. R., of N. Y., $16; O. D. D., of Mich., $45; T. R., of N. Y., $164; S. & B., of N. Y., $101; A. T., of Pa., $32; J. A. H., of Mo., $16; S. W., of Mass., $44; A. H. W., of N. Y., $16; E. S. A., of Ill., $16; A. R. S., of Pa., $16; W. S. N., of Mo., $16; C. B. G., of Iowa, $25; G. W. & H. H. F., of N. Y., $25; J. F. C., of N. Y., $22; B. M. F., of N. Y., $25; C. A., of N. Y., $25; J. G., of N. Y., $25; W. H., of Pa., $20; E. F., of N. Y., $41; J. B. R., of N. Y., $16; P. B., of N. Y., $41; H. T. S., of Pa., $20; J. McF., of N. Y., $16; W. R., of Wis., $45; N. & H., of N. J., $20; F. C. P., of N. Y., $20; F. H., of N. Y., $45; L. B. S., of Conn., $20; H. O. G., of Ill., $70; C. B. H., of Mass., $20; W. R., of N. Y., $31; B. M., of Ohio, $16; J. W. R., of N. J., $16; J. A. T., of Mass., $11; W. C. G., of N. Y., $19; W. O., of Mass., $16; U. B. V., of Pa., $16; B. & W., of Pa., $28; O. W., of N. Y., $25; H. & R., of Pa., $16; E. B., of Ind., $16; H. & S., of Ill., $35; C. G. H., of Kansas, $16; W. A. B., of Vt., $25; H. N. T., of Vt., $25; L. H., Jr., of N. J., $16; A. P., of Pa., $25; W. S. W. Jr., of Ill., $25; C. B. H., of N. Y., $10; H. & L., of Conn., $25; A. G. T., of Ill., $20; R. M., of N. Y , $16; G. E. H., of Maine, $25; S. E., of Pa., $25; F. J. T., of Conn., $25; J. W. H., of N. Y., $25; J. N. H., of Ind., $25; O. S. Jr., of Iowa, $25; C. W., of Iowa, $16; J. W., of Mass., $16; A. G. W., of Cal., $10; J. M. C., of Oregon, $25; H. L., of Minn., $16; A. I., of Ind., $16; V. H. H., of N. Y., $16; D. M., of Mass., $10; S. C. K., of Mass., $16; O. A. K., of R. I., $20; N. S. W., of Conn., $16; D. B. L., of N. Y., $16; B. F. T., of Mich., $16.

Persons having remitted money to this office will please to examine the above list to see that their initials appear in it and if they have not received an acknowledgment by mail, and their initials are not to be found in this list, they will please notify us immediately, stating the amount and how it was sent, whether by mail or express.

Specifications and drawings and models belonging to Parties with the following initials have been forwarded to the Patent Office, from Wednesday, March 2, 1864, to Wednesday, March 9, 1864 :—

P. B., of N. Y.; W. B., of N. Y.; H. W. K., of N. Y.; J. S., of N. Y.; G. W. & H. H. F., of N. Y.; Mrs. S. A. M., of N. Y. (2 cases); A. A., of N. Y.; J. F. C., of N. Y.; A. S. H., of N. Y.; F. A. DeM., of N. Y.; B. M. F., of N. Y.; A. & S., of N. Y.; C. A., of N. Y.; D. P., of N. Y.; D. M., of N. Y.; J. G., of N. Y.; A. S. G., of Ill.; W. A. B., of Vt.; G. E. H., of Maine; C. W. W., of Vt.; S. E., of Pa.; J. P., of Mass.; H. & L., of Conn.; O. W., of N. Y.; D. D. G., of Wis.; C. B. G., of Iowa; F. J. N., of Maine; E. S. H., of N. J.; S. W., of N. J.; H. A., of N. Y.; O. S. Jr., of Iowa; W. W., of N. Y.; W. H. B., of Ill.; B. & W., of Pa.; O. J. B., of Cal.; J. W. H., of N. Y.; C. P. L., of Conn.; J. N. H., of Ind.; F. J. T., of Conn.; A. P., of Pa.; J. M. C., of Oregon; T. R., of N. Y. (4 cases); J. McK., of N. Y.; D. M., of N. Y.

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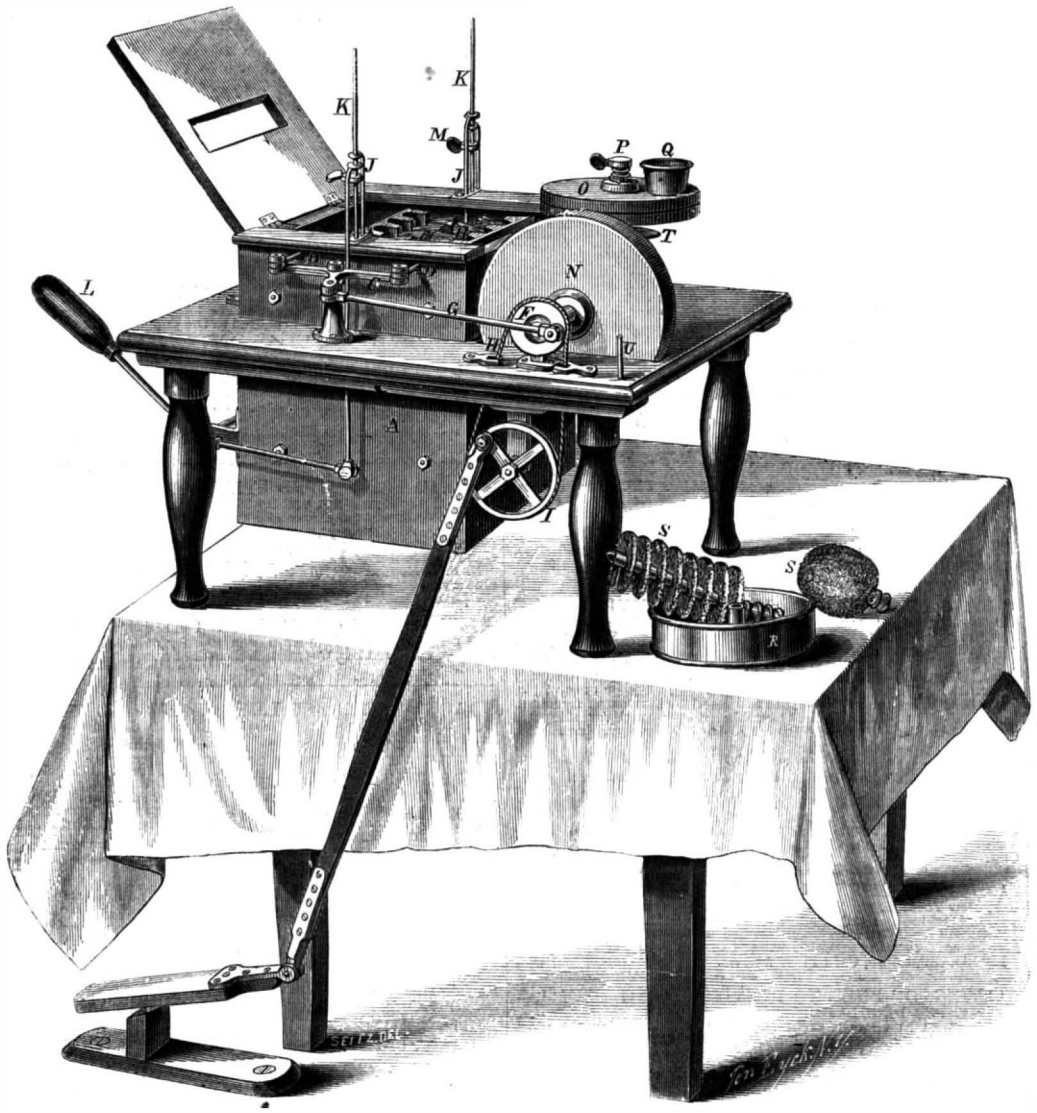

BRISTOL'S DISH-WASHING MACHINE.

an engraving representing what may be called "a family machine," for it is designed to wash dishes, clean lamp-chimneys, and scour and sharpen knives, not at one and the same time, however, but by several operations. This machine will have charms for our lady readers, who, we are happy to know, are zealous in the cause of science and "up" to all the newest improvements (we have several patents now pending by lady inventors); for the most delicate china, at one time in danger from the clumsy handling of careless servants, can, by the aid of this machine, be thoroughly cleansed without wetting a finger. Ivory-handled knives—the terror of housekeepers when intrusted to "Bridget"—need not become yellow or loose in the handles, as they may be cleansed in this machine perfectly without wetting the ivory. There are other virtues in this machine which will appear further on in our article.

The dish-washing part consists in providing the water-tight box or case, A, which is nicely finished, with a set of brushes, B. These brushes, shown in detail at Fig. 2, move back and forth in the box in the direction of the arrows with a scrubbing action. This motion is given by the bell-crank, C; the small rods, D, are attached to the brushes, and as the crank, C, works on a center it will be seen that the brushes move as explained when the wheel, F, revolves, carrying the end of the rod, G, around with it and driving the brushes back and forth. The wheel, F, is worked by a belt, H, running over the wheel, I, which is driven by a treadle placed on the floor, the same as a sewing machine. This comprises the main part of the dish-washer; there is a small bar inside the box, between the two brushes, which the plate to be washed rests upon; this bar is connected to two small rods, J, which are moved up and down on the guides, K, by working the handle, L, as if pumping water. This action moves the plate between the brushes and causes them, in connection with the hot water and suds which is to be poured in the box between and around the brushes, to thoroughly clean the ware; the small screw stop, M, on the guides, is to regulate the distance to which the plate is moved by the handle, L; there is an arm on each

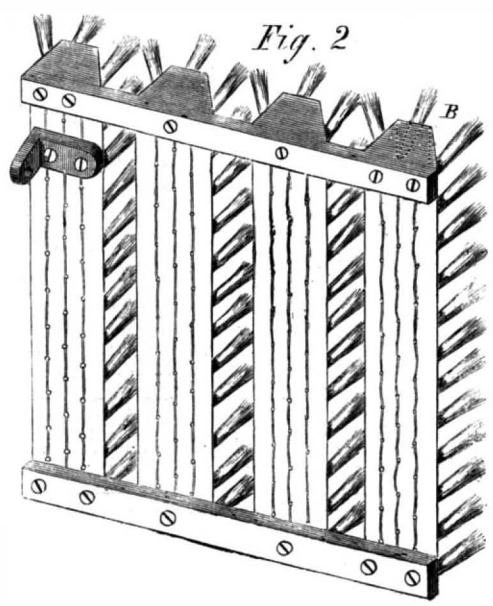

Fig. 2

end of the shaft the handle, L, is fixed to, so that both of the rods, J, are lifted together.

The grindstone, N, is turned by the same belt and wheel that moves the brushes, and it also answers for a fly-wheel to regulate the motion of the machinery. Behind the grindstone may be seen two wooden disks, O, covered on the scouring faces with leather; these disks are the knife-cleaners, and are worked by the same shaft the grindstone is on, through the action of bevel gears. The shaft the disks are on is square and they have a square hole in them; the pressure of one upon the other is regulated by a spiral spring and screw stop, P; the small cup, Q, has an opening in the bottom through which the bath-brick placed in the cup filters down upon the knives.

The pan, R, and brushes, S, are for washing lamp-chimneys, cups, bowls, &c.; the knife-scourers are taken off and the pan replaced, it rests on the plate, T, under the disk, O, and does not turn with it. The brush is stuck on the end of the square shaft by a socket made for the purpose, and a few turns of the shaft scour the chimney clean; water is poured into it of course when in use; the same process is repeated with cups and bowls, the water or drip being caught by the pan on the shaft. The small wire, U, beside the grindstone, is to hold the nut taken off the pin in the wheel that drives the stone; for when dishes alone are to be washed, it is not necessary to run the other parts, and they are disconnected. When flat dishes are washed, the lid of the box is shut down so that water may not splash out, and all grease accumulating in the box may be removed by placing a little soda in the same; this and the hot water makes a soap which will cleanse the brushes and box perfectly. Another reservoir is claimed by the patentees, wherein the brushes are nearly circular in form, and have a rotary motion and bevelled edge, whereby the water is thrown into the center of the plate and a more vigorous current of water driven through the brushes themselves. The grindstone is quite large, being ten inches in diameter.

There is also another attachment to this machine in course of construction, which is intended to wipe the plates and other articles; but as it is not completed, it is not shown here.

This machine is quite novel in its objects, and we are assured by the inventors that it has attracted the admiration of all who have seen it. It was patented on Nov. 3, 1863, through the Scientific American Patent Agency by A. M. & J. I. D. Bristol, of Detroit, Mich. State and county rights are for sale. [See advertisement in another column.] For further information address the patentees at Box 1393, Detroit, Mich.

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